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# TRANSCRIPT OF RECORD.

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SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1906.

No. 66.



JOHN A. BRILL AND THE J. G. BRILL COMPANY,  
APPELLANTS,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

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APPEAL FROM THE COURT OF APPEALS OF THE DISTRICT OF  
COLUMBIA.

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FILED JANUARY 31, 1906.

(20,999.)<sup>o</sup>



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*Transcript of Record.*

Court of Appeals, District of Columbia.

October Term, 1906.

No. 1662.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Appellants,  
vs.  
THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

Appeal From the Supreme Court of the District of Columbia.

Filed April 23, 1906.

1 In the Court of Appeals of the District of Columbia.

No. 1662.

JOHN A. BRILL et al., Appellants,  
vs.  
THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

Supreme Court of the District of Columbia.

No. 25161. In Equity.

JOHN A. BRILL and THE J. G. BRILL COMPANY  
vs.  
THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

UNITED STATES OF AMERICA,  
*District of Columbia, ss:*

Be it remembered, That in the Supreme Court of the District of Columbia, at the city of Washington in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:



*Bill of Complaint.*

Filed January 24, 1905.

Supreme Court of the District of Columbia. In Equity.

— Session, 190—. No. —.

No. 25161.

JOHN A. BRILL and THE J. G. BRILL COMPANY

VS.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

To the Honorable the Judges of the Supreme Court of the District of Columbia, Sitting in Equity:

John A. Brill, a citizen of the United States and a resident of Philadelphia, in the State of Pennsylvania, and the J. G. Brill Company, a corporation created and existing under and by virtue of the laws of the State of Pennsylvania, complainants bring this their bill of complaint against The Washington Railway and Electric Company, a corporation created and existing under and by virtue of the laws of the United States and under and by virtue of the laws of the United States especially applicable to the District of Columbia, defendant.

And thereupon your orators complain and say as follows:

1. They are informed and believe and here aver that the defendant corporation is organized and exists under the laws of the United States and is a citizen of the District of Columbia, having its principal office and doing business in the City of Washington, in the said District.

And your orators are informed and believe and here aver that the defendant corporation is engaged and has for a long time last past been engaged in operating street railways, in the City of Washington in the said District of Columbia.

2. They are informed and believe that George Martin Brill of Philadelphia was, before the third day of July, 1897, the original and first inventor of certain new and useful improvements in Car-Tracks for Motor Propulsion, which improvements had not been known or used before his invention thereof.

3. That so being the original and first inventor of said improvements, and the same not having been known or used by others in this country before his invention thereof, and not having been patented or described in any printed publication in this or any foreign country before his invention thereof, or more than two years prior to his application for letters patent thereon, and not having been in public use or on sale in this country for more than two years prior to his said application, and not having been abandoned, he made application in due form of law to the Commissioner of Patents for letters patent of the United States for the said invention. There-

upon such proceedings were had that letters patent of the United States were granted and issued in due form of law and delivered to him, the said letters patent being numbered 627,898, and dated June 27, 1899, whereby was secured to him, his executors, administrators or assigns, for the term of seventeen years from the date of said letters patent, the full and exclusive right and liberty of making, using and vending to others to be used the said improvements throughout the United States and the Territories thereof as by the said letters patent or a duly authenticated copy thereof in court to be produced will fully and at large appear; and the said George Martin Brill was thereafter continuously the exclusive owner of the said United States letters patent, and of all the rights secured thereby until the eighth day of July, 1899, when by an assignment in writing of that date, executed and delivered by said George Martin Brill, the said George Martin Brill assigned, sold and set over unto your orator, John A. Brill, all his right, title and interest in and to the said letters patent, and all his rights of action thereunder, which said assignment was duly recorded in the Patent Office of the United States, as by the said assignment, and the certificate of such recording thereto affixed or by a duly authenticated copy thereof, ready in court to be produced, will fully and at large appear.

4. And your orators further show unto your Honors that by virtue of the premises he the said John A. Brill became, and  
3 now is, the sole and exclusive owner of said letters patent, numbered 627,898, and of the invention described therein, and of all the rights and privileges granted and secured, or intended to be granted and secured thereby, and of the rights of action thereunder; and the J. G. Brill Company, complainant, by virtue of a verbal agreement between it and the said John A. Brill has ever since the eighth day of July, 1899, been and now is possessed of the sole and exclusive right and license to make and sell said patented invention under said letters patent No. 627,898 for the entire United States and the Territories thereof, and is now and has been since the last mentioned date, engaged in the manufacture and sale of car-trucks under said license.

5. They are informed and believe that the said George Martin Brill was before the third day of July, 1897, the original and first inventor of certain other new and useful improvements in car trucks, which improvements had not been known or used before his invention thereof.

6. That so being the original and first inventor of said improvements, and the same not having been known or used by others in this country before his invention thereof, and not having been patented or described in any printed publication in this or any foreign country before his invention thereof, or more than two years prior to his application for letters patent thereon, and not having been in public use or on sale in this country for more than two years prior to his said application, and not having been abandoned, he made application in due form of law to the Commissioner of Patents for letters patent of the United States for said invention. Thereupon such proceedings were had that letters patent of the United States

were granted and issued in due form of law and delivered to him, said letters patent being numbered 627,900, and dated June 27, 1899, whereby was secured to him, his executors, administrators or assigns, for the term of seventeen years from the date of said letters patent, the full and exclusive right and liberty of making, using and vending to others to be used the said improvements throughout the United States and the Territories thereof, as by the said letters patent or a duly authenticated copy thereof in court to be produced will fully and at large appear; and the said George Martin Brill was thereafter continuously the exclusive owner of said United States letters patent and of all the rights secured thereby, until the eighth day of July, 1899, when by an assignment in writing of that date, executed and delivered by said George Martin Brill, the said George Martin Brill, assigned, sold and set over unto your orator, John A. Brill, all the right, title and interest in and to the said letters patent and all his rights of action thereunder, which said assignment was duly recorded in the Patent Office of the United States, as by said assignment and the certificate of such recording thereto affixed or by a duly authenticated copy thereof, ready in court to be produced, will fully and at large appear.

7. And your orators further show unto your Honors that by virtue of the premises he, the said John A. Brill, became, and now is, the sole and exclusive owner of said letters patent, numbered 626,900,

and of the invention described therein, and of all the rights and privileges granted and secured, or intended to be granted and secured thereby, and of the rights of action thereunder; and the J. B. Brill Company, complainant, by virtue of a verbal agreement between it and the said John A. Brill has, ever since the eighth day of July, 1899, been and now is possessed of the sole and exclusive right and license to make and sell said patented invention under said letters patent No. 627,900 for the entire United States and the Territories thereof, and is now and has been since the last mentioned date engaged in the manufacture and sale of car trucks under said license.

8. And your orators further show unto your Honors that the said inventions or discoveries are very valuable and useful to the public, and the same have been extensively introduced into public use, and that your orator's rights in the premises have been generally acquiesced in and recognized by the public, and your orators would, but for the wrongful acts of the said defendant, and others acting in concert with the said defendant, have made large gains and profits from the manufacture, use and sale of said inventions, which they have been and are now hindered from making by reason of said wrongful acts of the said defendant.

9. And your orators further show unto your Honors, upon information and belief, that the said defendant, well knowing the premises and the rights and privileges secured unto your orators and in order to deprive them of the profits, benefits and advantages which might and otherwise would have accrued to them, at the city of Washington, in the District of Columbia, and elsewhere within the said District of Columbia, and without the license and permis-

sion of your orators or of the said George Martin Brill, has, before the commencement of this suit, unlawfully and wrongfully used, or caused so to be, street or other cars containing conjointly on each car the said inventions or discoveries and improvements, described and patented in the said several letters patent, numbered 627,898 and 627,900.

10. And your orators further show unto your Honors that the said inventions so patented as aforesaid are important and useful elements in the construction of a useful and efficient street or other car and car truck, and are so nearly allied in character as to be capable of conjoint as well as separate use on such cars or trucks and your orators are informed and believe that each and all of the said inventions so patented as aforesaid are used by the defendant conjointly and not separately on street cars and trucks and that a large number of such cars and car trucks used by the defendant contain and use, each one of them each and all of the said several inventions set forth, which said unlawful use by the defendant as aforesaid is a violation and infringement of your orators' exclusive rights and privileges, and to your orators' great and irreparable loss and injury, and by which your orators have sustained and been put to great loss and damage, and have been and still are deprived of great gains and profits, which your orators might and otherwise would have obtained and received, but which have been received and enjoyed, and are being received and enjoyed, by the said defendant, by and through its aforesaid unlawful acts and doings; and

5 that the said defendant has derived and received, and is still deriving and receiving therefrom great gains and profits but to what amount your orators are ignorant and cannot set forth, but your orators believe the same to be about the sum of \$25000, and so charge the fact to be, and pray that the said defendant may be required to make a discovery as to its use of said invention, and of all gains and profits received by it therefrom or by means thereof.

11. And your orators further show unto your Honors that the aforesaid using of said inventions by the said defendants and its confederates, and its proparation and determination to continue the same, and the aforesaid unlawful wrongful acts, have the effect to encourage and induce other persons to infringe and defy the letters patent as aforesaid and the aforesaid rights and privileges of your orators.

12. And your orators further show unto your Honors that in vending car trucks containing the subject matter of the above mentioned letters patent and each of them they have given notice to the public that the same is patented by fixing thereon the word "Patented" together with the date and year as aforesaid in which the said letters patent were respectively granted.

13. And your orators further show unto your Honors that the said defendant has been warned and requested and notified to desist and refrain from said infringement and said unlawful and wrongful acts, but the said warning and request and notice have been wholly

disregarded by said defendant, and that said defendant still continues the infringement and unlawful and wrongful acts aforesaid.

14. And your orators pray that the said defendant may be compelled by a decree of this Honorable Court to account for and pay over unto your orators all such gain and profits as have accrued or arisen to or have been earned or received by the said defendant, and all damages your orators have sustained by reason of the said infringement by the said defendant, and that this court may assess said profits and damages and may increase the damages to a sum not exceeding three times the amount thereof.

15. And that the said defendant, its agents, attorneys, servants and workmen, be enjoined and restrained by the order and injunction of this court from directly or indirectly selling, making or causing to be made, using or causing to be used, or vending to others to be used in any manner, any street or other cars or car trucks containing or embodying or in any way counterfeiting or imitating any of the said inventions described and secured in said letters patent and from infringing upon or violating the said letters patent, by the manufacture, use or sale of street or other cars or car trucks in any way whatever, and that the said defendant may be decreed to pay the costs of this suit, and may be enjoined and restrained as aforesaid during the pendency of this suit, and that your orators may have such other or further order or relief as to this Honorable Court shall seem meet and shall be agreeable to equity.

To this end, therefore, that the said defendant may, if it can, show why your orators should not have the relief hereby prayed, and direct and perfect answers make according to the best of its or its agents', attorneys', clerks' servants', and workingmen's knowledge, remembrance, information and belief, to the several matters herein-

6 before set forth as fully and particularly as if the same were repeated here, paragraph by paragraph, and they thereto severally and specifically interrogated,

May it please your Honors to grant to your orators a writ of *subpoena ad respondendum* issuing out of and under the seal of this Honorable Court, directed to the said defendant, the said The Washington Railway and Electric Company, commanding it by a certain day and under a certain penalty to be and appear before this Honorable Court, then and there to make answer unto this bill of complaint, but not under oath, which is waived, and to perform and abide by such order and decree herein as to this court may seem meet and agreeable to equity.

And your orators will ever pray &c.

JOHN A. BRILL.

J. G. BRILL COMPANY,

By G. MARTIN BRILL, *Pres't.* [SEAL.]

Attest: JAMES RAWLE, *Secretary.*

CHURCH & CHURCH,  
*Sol'rs for Complainants.*  
FRANCIS RAWLE,  
*Of Counsel.*



*Answer of Def't, Washington Railway & Electric Co.*

Filed March 6, 1905.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
against

THE WASHINGTON RAILWAY & ELECTRIC COMPANY, Defendant.

The Answer of The Washington Railway & Electric Company to the  
Bill of Complaint of John A. Brill and the J. G. Brill Company.

This defendant, now and at all times hereafter, saving and reserving unto itself all benefits and advantage of exception which can or may be had or taken to the many errors, uncertainties and other imperfections in the said complainants' said bill of complaint for answer thereto or unto so much and such parts thereof as this defendant is advised is or are material or necessary for it to make answer unto, this defendant says:

First. The defendant, The Washington Railway & Electric Company admits that it is a corporation organized and existing under the laws of the United States and is a citizen of the District of Columbia, having its principal office and doing business in the City of Washington in the said District, and that it is engaged in operating street railways in the said City of Washington and in the District of Columbia.

Second. This defendant, upon information and belief, denies that heretofore and prior to the 3rd day of July, 1897, George Martin

Brill was the original, first and sole inventor of certain new  
7 and useful improvements in car trucks for motor propulsion  
as alleged in said bill of complaint, and says that it is not true that the said alleged inventions were not known and used by others in this country and not patented or described in any printed publication in this or any foreign country before the alleged invention thereof or for more than two years prior to his applications for letters patent therefor, and not in public use or on sale for more than two years prior to his applications for letters patents therefor; and defendant alleges, upon information and belief, that said George Martin Brill was not the true or first inventor or the sole inventor of the structures described in said letters patents; and that the alleged inventions had been in public use or on sale for more than two years prior to the said Brill application for letters patents therefor; and that the alleged inventions had been abandoned to the public, and that the said letters patents were granted upon false and fraudulent representations respecting the same, and are absolutely void.

Third. This defendant admits that said Brill made applications for letters patents, but whether he complied with the law in respect

thereto, as alleged in said bill of complaint, it is not informed, and therefore it neither admits nor denies it but leaves the complainants to their proofs.

Fourth. This defendant, upon information and belief, admits that letters patents Nos. 627,898 and 627,900, dated June 27, 1899 were granted to said Brill, as set forth in said bill of complaint, but it is not informed save by said bill of complaint whether said letters patents for said alleged inventions were, in full compliance with the statutes, of the United States, issued and delivered to the said Brill under the seal of the Patent Office of the United States, or were signed by the Secretary of the Interior or were countersigned by the Commissioner of Patents, or whether said Brill complied in all respects with the conditions and requirements of the statutes of the United States and the rules and requirements of the Patent Office, in such case made and provided; and therefore it leaves complainants to make such proofs thereof as may be; and it denies that said letters patent granted to the said Brill, his heirs or assigns, for the term of seventeen years, or for any other term, the exclusive right to make, use or sell, or vend to others to be used, the alleged inventions or any rights whatsoever.

Fifth. This defendant avers, on information and belief, that the said George Martin Brill surreptitiously and unlawfully made applications for said letters patents with the intent to divert unto himself and to obtain the control of matters and things which were granted to the public to use and which were not of his invention or discovery, and that therefore said letters patents, and each of them are null and void; it admits, upon information and belief, that said George Martin Brill assigned said letters patent to John A. Brill by an assignment in writing which was recorded in the Patent Office, and it avers that by reason thereof said John A. Brill became and has since been the sole and exclusive owner of said letters patents and any and all pretended rights thereunder.

Sixth. This defendant has no knowledge or information sufficient to form a belief whether the J. G. Brill Company, complainant, is now or has been since the 8th day of July, 1899, the sole and exclusive licensee under the said letters patents by virtue of the oral agreement made between John A. Brill and the J. G. Brill Company; but, upon information and belief, it avers that said John A. Brill after said 8th day of July, 1899, claimed all rights under said letters patents and brought suit as the sole owners of said letters patents and did not join the complainant, the J. G. Brill Company, as a complainant in said suit.

Seventh. This defendant avers, upon information and belief, that it is not true, as alleged in said bill of complaint, that complainants have any exclusive rights in and to the alleged inventions described and set forth in said letters patents; on the contrary, this defendant avers, upon information and belief, that the alleged inventions described and claimed in said letters patents are not as a matter of fact inventions, and that the complainants had no exclusive rights therein whatsoever, but that they are public property, open and free to all to use.

Eighth. This defendant, upon information, states that it is not informed, except by said bill of complaint, whether the complainant, the J. G. Brill Company, is able and willing to manufacture and sell all car trucks made in accordance with the respective letters patents that the market may require; it denies that said inventions or discoveries are very valuable and useful to the public; it denies that the complainants' alleged rights in the premises have been generally acquiesced in and recognized by the public; and it denies that the defendant has committed any wrongful acts by which the complainants have been deprived of any gains or profits that might have arisen by the manufacture, use and sale of said alleged inventions.

Ninth. This defendant denies that at the time and place alleged in said bill of complaint, or at any other time or place, it did make, use or vend structures embodying the alleged improvements set forth and described in said letters patents sued upon; or that it in any way infringed upon the alleged rights or any rights of the complainants, or intended so to do; and denies that it has manufactured, used or sold, or intends to manufacture, use or sell, or cause to be manufactured, used or sold, structures in the manner set forth, or in infringement of said letters patents; or that it is preparing so to do; or that it is threatening so to do, as set forth in said bill of complaint; and this defendant denies that it has received any gains or profits from or damaged the complainants by the manufacture, use or sale of any car trucks to which the complainants are entitled, or that it has done or caused to be done any act which would cause, or tend to cause, others to disregard the alleged rights of the complainants; or that it intends so to do.

Tenth. This defendant, upon information and belief, says that letters patents Nos. 627,898 and 627,900, issued to George Martin Brill June 27, 1899, are each void by reason of the following special matters:

(a.) That for the purpose of deceiving the public, the descriptions and specifications filed by the said George Martin Brill in the Patent Office were made to contain less than the whole truth relative to the alleged invention or discovery, or more than is necessary to produce the desired result.

(b.) That the things patented in said letters patents, and each of them, had been patented and described prior to said Brill's alleged invention or discovery in the following letters patents to the following named persons, to wit:

- C. S. Buck, No. 112,897, dated Mar. 21, 1871.
- A. Overbagh, No. 104,876, dated June 28, 1870.
- Davenport & Bridges, No. 2,071, dated May 4, 1841.
- Davenport & Bridges, Reissue No. 183, dated Dec. 3, 1850.
- V. D. Beach, No. 173,257, dated Feb. 8, 1876.
- L. H. West, No. 49,942, dated Sep. 12, 1865.
- L. B. Thyng, No. 4,276, dated Nov. 18, 1845.
- W. Romans, No. 34,270, dated Jan. 28, 1862.
- A. F. Smith, No. 40,957, dated Dec. 15, 1863.
- J. Murray, No. 48,048, dated June 6, 1865.

- J. W. Evans, No. 64,087, dated Apr. 23, 1867.  
 E. J. Horner, No. 89,999, dated May 11, 1869.  
 Perry G. Gardiner, No. 92,183, dated July 6, 1869.  
 Perry G. Gardiner, No. 98,049, dated Dec. 21, 1869.  
 Ashbel Welch, No. 93,146, dated July 27, 1869.  
 Jesse Winecoff, No. 119,956, dated Oct. 17, 1871.  
 G. F. Godley, No. 137,300, dated Apr. 1, 1873.  
 J. E. Wooten, No. 165,647, dated July 13, 1875.  
 J. Eccles, No. 169,792, dated Nov. 9, 1875.  
 Dick & Luders, No. 207,020, dated Aug. 13, 1878.  
 W. P. Hensell, No. 212,688, dated Feb. 25, 1879.  
 W. Mason, No. 227,029, dated Apr. 27, 1880.  
 J. B. Whitcomb, No. 225,087, dated Mar. 2, 1880.  
 D. E. Small, No. 234,621, dated Nov. 16, 1880.  
 E. Longstreth, No. 249,962, dated Nov. 2, 1881.  
 S. D. King, No. 249,370, dated Nov. 8, 1881.  
 J. P. Clarkson, No. 272,208, dated Feb. 12, 1883.  
 S. D. King, No. 273,693, dated Mar. 6, 1883.  
 N. H. Davis, No. 287,640, dated Oct. 30, 1883.  
 H. J. Mitchell, No. 292,248, dated June 22, 1884.  
 C. N. Haskin, No. 330,023, dated Nov. 10, 1885.  
 J. H. Stephenson, No. 311,541, dated Feb. 3, 1885.  
 H. C. McCarty, No. 314,469, dated Mar. 24, 1885.  
 J. K. Woolley, No. 321,776, dated July 7, 1885.  
 W. E. Teller, No. 344,017, dated June 22, 1886.  
 Hausler & Ritzler, No. 359,388, dated Mar. 15, 1887.  
 C. T. Schoen, No. 378,264, dated Feb. 21, 1888.  
 S. J. Block, No. 416,355, dated Dec. 3, 1889.  
 E. Peckham, No. 424,723, dated Apr-l 1, 1890.  
 J. Taylor, No. 455,990, dated July 14, 1891.  
 E. Peckham, No. 464,253, dated Dec. 1, 1891.  
 W. Boughton, No. 472,724, dated Apr-l 12, 1892.  
 J. Taylor, No. 507,050, dated Oct. 17, 1893.  
 J. Taylor, No. 507,855, dated Oct. 31, 1893.  
 B. F. Manier, Jr., No. 529,284, dated Nov. 13, 1894.  
     E. A. Sperry, No. 535,304, dated Mar. 5, 1895.  
 10      W. S. Adams, No. 538,858, dated May 7, 1895.  
     E. Cliff, No. 548,827, dated Oct. 29, 1895.  
 W. S. G. Baker, No. 553,298, dated Jan. 21, 1896.  
 W. Case, No. 563,014, dated June 30, 1896.  
 E. Cliff, No. 577,007, dated Feb. 16, 1897.  
 H. C. Williamson, No. 580,203, dated Apr-l 6, 1897.  
 H. C. Williamson, No. 580,204, dated Apr. 6, 1897.  
 E. Cliff, No. 582,343, dated May 11, 1897.  
 W. E. Cook, No. 595,045, dated Dec. 7, 1897.  
 M. Thompson, No. 27,099, dated May 25, 1897.  
     (Design).  
 E. Peckham, No. 563,685, dated July 7, 1896.  
 S. H. Short, No. 567,662, dated Sep. 15, 1896.  
 W. S. Adams, No. 513,226, dated Jan. 23, 1894.  
 J. S. Graham, N. 603,044, dated Aug. 8, 1893.  
 G. H. Graham, No. 496,933, dated May 9, 1893.

- E. Vespertraete, No. 438,719, dated Oct. 21, 1890.  
 W. Youmans, (German) No. 47,266, Pub. May 31, 1889.  
 C. O. Snyder, No. 423,396, dated Mar. 11, 1890.  
 H. C. Bird, No. 436,031, dated Sep. 9, 1890.  
 J. N. Heffernan, No. 412,256, dated Oct. 8, 1889.  
 G. S. Strong & A. Mitchell, No. 312,928, dated Feb. 24, 1885.  
 G. M. Brill & S. M. Curwen, No. 610,118, dated Aug. 30, 1898.  
 G. M. Brill & S. M. Curwen, No. 610,119, dated Aug. 30, 1898.  
 E. Spencer, (British), No. 5,526, of 1895.  
 R. Eaton, (British), No. 2,752, of 1856.  
 H. Conradi (British), No. 2,603, of 1878.  
 G. Spencer & E. S. Stidolph, (British), No. 2,230, of 1876.

and many others which this defendant has not yet ascertained but which it craves leave to insert in its answer by amendment as soon as ascertained.

(c.) That the things patented in said letters patents Nos. 627,898 and 627,900, and each of them, had been in public use or on sale in this country for more than two years prior to said Brill's application for letters patents therefor, and that the persons to whom said letters patents above recited were issued knew of such public use and sale, as did also the said George Martin Brill and John A. Brill, and others not known to respondent, and it craves leave to make the names and residences of such persons a part of this answer, when discovered.

Eleventh: This defendant is informed and believes, and therefore avers and charges the fact to be, that said letters patents sued upon, Nos. 627,898, and 627,900, issued June 27, 1899, to George Martin Brill, and each of them, and each and every claim thereof, are invalid and void from matters appearing on the face of said patents and from various well-known facts of common knowledge.

Twelfth: This defendant says, upon information and belief, that said letters patents Nos. 627,898 and 627,900 do not show or disclose any invention whatever, in view of the state of the art in the manufacture of car trucks and other vehicles, all of which were well known and in common use; and in view of the state of the art said George Martin Brill has not in his said letters patents, or either of them, disclosed any new or patentable inventions whatever,  
 11 and that the alleged inventions involve, if anything, simple mechanical skill and judgment.

Thirteenth: This defendant, upon information and belief, alleges, and will prove, that the said alleged inventions alleged to have been made by the said George Martin Brill and disclosed in said letters patents Nos. 627,898 and 627,900, were old at the time of making thereof, and were at that time a common and well-known means of attaining the object said to be attained by the said George Martin Brill; and that the same were constantly being used in the manufacture of car trucks and other vehicles; and that therefore said letters patents are void.

Fourteenth: And this defendant, further answering, upon information and belief, as further special matter, says that the file wrappers and contents of said letters patents Nos. 627,898, and 627,900



will disclose the unpatentable character of the subject matter of the claims of said letters patents, as will more fully appear by certified copies of said file wrappers and contents, in Court to be produced.

Fifteenth: This defendant further answering, upon information and belief, alleges that the car trucks in use by it and alleged by the complainants to be infringements of the two aforesaid letters patents are constructed in accordance with the invention of United States Letters Patent to Charles F. Uebelacker, granted October 31, 1899, No. 635,986.

Sixteenth: This defendant further alleges, and will prove, that John A. Brill, one of these complainants, long prior to the commencement of this suit, brought suit against the North Jersey Street Railway Company, a corporation duly organized and existing under the laws of the State of New Jersey, in the United States Circuit Court for the District of New Jersey, based upon these same two letters patents, as aforesaid, and trucks of the same name and nature, and in all respects similar were alleged to infringe in like manner as those involved herein, and manufactured either by the Peckham Motor Truck and Wheel Company, which company defended the suit in the District of New Jersey, or the Peckham Manufacturing Company which bought out the business of the aforesaid company and continued to make trucks of the type aforesaid; that the charge of infringement as to patent No. 627,898, which contains 111 claims, was restricted to claims, 1, 3, 6, 10, 11, 13, 14, 15, 17, 18, 30, 32, 33, 80, 81, 87, 91, 92, 93, 95, 96, 97, 98, 99, 102, 105, 107, 108 and 110, and as to patent No. 627,900 to claims 13, 14, 15 and 17; that it was admitted by complainants upon the hearing before the Honorable Edward G. Bradford, District Judge, that unless the suit could be maintained with respect to the 13th claim of patent No. 627,898, and as to claims 13 and 17 of the patent No. 627,900, the suit could not be maintained as to any of the claims involved; that, after due consideration, Judge Bradford held the three claims aforesaid to be valid and infringed; that upon the settlement of the decree the claims involved were further limited to claims 6, 10, 11, 13, 14, 15, 30, 80, 81 and 87 or patents No. 627,898 and claims 13 and 17 of patent No. 627,900, and the same were held valid and infringed, by said

12 decree, and an interlocutory injunction was granted but suspended pending appeal; that thereafter the defendant took an appeal to the Circuit Court of Appeals for the Third Circuit and that said appeal was heard before three Judges of said Court, who unanimously handed down a decision reversing the decree of the Circuit Court, with costs; all of which matters will more fully and at large appear by reference to certified copies of the records, opinions &c. in said case, here in court ready to be produced.

Seventeenth: This defendant further alleges, and will prove, that these complainants, subsequent to the signing of the interlocutory decree of the Circuit Court for the District of New Jersey by the Honorable Edward G. Bradford, and prior to the decision of the appeal by the Judges of the Circuit Court of Appeals for the Third Circuit, brought suits in the Southern District of New York against the Peckham Manufacturing Company (et al.) and the Peckham Motor Truck and Wheel Company, (et al.) corporations duly or-

ganized and existing under the laws of the State of New York, based on these same two letters patent, as aforesaid, and trucks of the same name and nature, and in all respects similar being alleged to infringe in like manner as those involved herein and manufactured by the respective corporations defendant, and that thereafter, and long prior to the suit herein, moved for preliminary injunctions in both suits; that the charge of infringement as to patent No. 627,898 was restricted to claims 6, 10, 11, 13, 14, 15, 30, 80, 81 and 87 and as to patent No. 627,900 to claims 13 and 17; that it was admitted by complainants at the hearing before the Honorable E. Henry Lacombe, Circuit Judge, that unless the motions could be maintained as to claim 13 of patent No. 627,898 and as to claims 13 and 17 of patent No. 627,900, they could not be maintained as to any of the claims involved; that thereafter, after due consideration, interlocutory injunctions were granted by Judge Lacombe against both companies, but suspended in the case of the Peckham Manufacturing Company pending a decision of the appeal in the Third Circuit; that thereafter the defendants in the suit against the Peckham Manufacturing Company took an appeal to the Circuit Court of Appeals for the Second Circuit, but that no appeal was taken in the case of the Peckham Motor Truck and Wheel Company because the said Company had gone out of business; that after due consideration the Circuit Court of Appeals for the Second Circuit reversed the order of the Circuit Court for the Southern District of New York, all of which matters will more fully and at large appear by reference to certified copies of the records, opinions, &c. in said cases, here in court ready to be produced.

Eighteenth: And this defendant, further answering, prays that it may from time to time amend the answer herein, with respect to all statements of whatever name and nature herein contained, according as the facts may be added to, lessened or varied and, particularly, should new facts occur or be discovered not now known to it.

Nineteenth: And this defendant, further answering, denies that the said complainants are entitled to the relief, or any part thereof, in their bill of complaint demanded; and it prays the same advantage of this answer as if it had pleaded or demurred to said bill of complaint.

All of which foregoing statements and defenses this defendant is ready and willing to aver, maintain and prove as this honorable court shall direct; and without admitting as true any of the matters charged and alleged in said bill of complaint not herein well and truly answered, confessed, traversed and avoided, or denied, prays to be hence dismissed with its costs and charges in this behalf most wrongfully sustained.

WASHINGTON RAILWAY AND ELECTRIC CO.,

By JAS. B. LACKEY, *Secretary*.

WARFIELD & DUELL,

*Solicitors and Counsel for Defendant,*

220 Broadway, New York City.

UNITED STATES OF AMERICA,  
*District of Columbia, City of Washington, ss:*

James B. Lackey, being duly sworn, deposes and says that he is the Secretary of the Washington Railway & Electric Company, the above-named defendant, and is conversant with the affairs of said corporation; that he has read the foregoing answer and knows the contents thereof, and that the same is true of his own knowledge except as to such matters as are therein stated on information and belief, and that as to such matters he verily believes the same to be true.

JAS. B. LACKEY.

Subscribed and sworn to before me this 6<sup>th</sup> day of March, 1905.

[SEAL.]

F. J. WHITEHEAD,  
*Notary Public.*

*Replication.*

Filed March 10, 1905.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
 vs.  
 THE WASHINGTON RAILWAY & ELECTRIC COMPANY, Defendant.

These repliants, saving and reserving unto themselves all and all manner of advantage of exception, which may be had or taken to the manifold errors, uncertainties, and insufficiencies of the answer of the said defendant, for replication thereunto, say, that they do and will aver, maintain and prove their said bill to be true, certain and sufficient in the law to be answered unto by the said defendant, and that the answer of the said defendant is uncertain, evasive and insufficient in law to be replied unto by these repliants, without this, that any other matter or thing whatsoever in the said answer contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true; all which matters and things these repliants are ready to aver, maintain and prove as this Honorable Court shall direct, and hereby pray as in and by their said Bill they have already prayed.

CHURCH & CHURCH,  
*Solicitors for Complainants.*

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*Depositions on Behalf of Complainant.*

Filed July 27, 1905.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and THE J. G. BRILL Co., Complainants,

vs.

THE WASHINGTON RAILWAY &amp; ELECTRIC Co., Defendant.

To Mess. Warfield & Duell, Solicitors for Defendants, 220 Broadway,  
New York City, Borough of Manhattan, New York.

GENTLEMEN: Please take notice that the Complainants herein will take the deposition, *de bene esse*, of Charles F. Uebelacker, whose address is at # 2020 State St., care of Ford, Bacon & Davis, in the City of Chicago, County of Cook, and State of Illinois, and which is beyond the District of Columbia, for use in behalf of Complainants herein, before Mr. Andrew Hummeland, a notary public in and for the County of Cook and State of Illinois, who is not of counsel or attorney for any party to the cause, and who is not in anywise interested in the event of the cause, at the office of Mess. Willard & Evans No. 87 East Washington Street, Chicago, Ill. on the 24th day of July, 1905 at 11 o'clock A. M., and thereafter from day to day as the taking of the deposition may be adjourned.

Such Deposition will be taken in accordance with the provisions of Section 1058 of the Code of Law for the District of Columbia.

You are invited to attend and cross-examine.

JOSEPH L. LEVY,

*Of Counsel for Compl'ts.*

Service acknowledged this 18<sup>th</sup> day of July, 1905.

WARFIELD &amp; DUELL,

*Defendant's Solicitors.*

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and THE J. G. BRILL CO., Complainants,  
vs.  
THE WASHINGTON RAILWAY & ELECTRIC CO., Defendant.

Deposition of Charles F. Uebelacker, taken *de bene esse* in the above entitled cause on behalf of complainants pursuant to annexed notice before Andrew Hummeland, a Notary Public, in and for the County of Cook, State of Illinois, at the office of Messrs. Willard & Evans, No. 87 East Washington street, Chicago, Illinois, commencing at eleven A. M. July 24th, 1905.

Present: Robert Lewis Ames, Esq., for Complainants. Warfield & Duell, for Defendant.

CHARLES F. UEBELACKER, being duly cautioned and sworn, in answer to interrogatories propounded by Mr. Ames testified as follows:

15 Q. 1. Please state your name, age, residence and occupation.

A. Charles F. Uebelacker; age, 37; residence, Hackensack, N. J.; occupation, electrical engineer.

Q. 2. What is your college training?

A. I was graduated in 1890 as electrical engineer at Princeton College.

Q. 3. Where are you employed at present?

A. Employed by Ford, Bacon & Davis, No. 24 Broad Street, New York, engineers.

Q. 4. Will you please explain your presence in this city?

A. I am here at the instruction of the firm who employ me.

Q. 5. Where were you employed in 1893?

A. In November, 1893, I entered the employ of the Consolidated Traction Co. at Newark and Jersey City, N. J.

Q. 6. How long did you remain in the employ of that company?

A. Until March, 1897.

Q. 7. Were you continuously in the employ of that company?

A. I was between those dates.

Q. 8. What position did you hold in the latter part of your employment with that company?

A. Master mechanic.

Q. 9. What were your duties as master mechanic?

A. I had charge of the maintenance of the rolling stock.

Q. 10. Who was the general manager of the Consolidated Traction Company of New Jersey at that time?

A. David Young.

Q. 11. Did Mr. Young ever confer with you as to the advisability of purchasing some short wheel base trucks of a peculiar type?



By Mr. WARFIELD: That question objected to as indefinite and as ambiguous in the use of term "peculiar."

By Mr. AMES: Question withdrawn.

Q. 12. During the time that you were master mechanic, did Mr. Young confer with you regarding a special type of short wheel base truck?

By Mr. WARFIELD: Same objection. As to whether or not the type of truck referred to was a special one is a matter of fact, and should not be interpolated in the question. Moreover, testimony of the witness in regard thereto would be merely a conclusion and could not affect the facts. The question should be confined to the eliciting of facts without attempting to color the record by such indefinite questions.

A. He did shortly before I left the employ of the Consolidated Traction Company.

Q. 13. What did he say at this time, and if you can give the date of this conversation, please do so?

By Mr. WARFIELD: Objected to as obviously incompetent and calling for hearsay testimony.

A. The conversation occurred to the best of my recollection in February, 1897, at Mr. Young's office in Jersey City. He showed me a photograph of the truck and asked my opinion relative to its merits.

16 Q. 14. What in general was the type of truck of which he then asked your opinion, and of which you were shown a photograph?

A. The truck was a swivel truck with short wheel base, side frames of one piece, and supporting through links let into the side frame, near the jaws, spiral springs from which it turned were supported by stirrups the ends of semi-elliptic springs. These semi-elliptic springs lay in the same plane as the side frames, and on their spring bands were clamped a pair of jaws reaching up above the side frames, and supporting directly above the elliptic springs plates to carry the weight of the car body.

The jaws attached to the semi-elliptic springs under the two side frames were connected by a bar carrying at its center a swivel plate. This bar was arched up so as to permit the placing of one motor in the truck, the nose and suspension of which would fall immediately beneath this transverse bar.

The details of the brake rigging outside of the fact that it was an outside brake rigging, and provided with a radius bar, I do not recall definitely.

Q. 15. How were the links supported in the side frames?

A. Do you refer to my recollection of the photograph? I have not any recollection of the method shown in it.

Q. 16. Could you identify the photograph shown you by Mr. Young, or one similar to it?

A. Yes.

Q. 17. Please look at the photograph which I now hand you and state what it is.

A. I do not believe that photograph 1134 which you hand me is the same as the one shown me by Mr. Young. It strikes me as being a different view of the same truck. The photograph shown me by Mr. Young, to the best of my recollection, gave a partial top and side view of the truck, the left-hand end of the truck being further retired in the perspective than the right hand, whereas the photograph shown me now is the reverse.

Q. 18. Of whose manufacture did you understand this truck to be at the time of your conversation with Mr. Young in 1897?

A. The J. G. Brill company.

Q. 19. At this time of your conversation with Mr. Young, did you have any prior knowledge of a truck having the same or similar spring system?

A. No.

Q. 20. Was this truck described to you by Mr. Young at this time?

A. No.

Q. 21. By whom were you employed after leaving the Consolidated Traction Company of New Jersey, and in what capacity.

A. Peckham Motor Truck and Wheel Company as superintendent.

Q. 22. In general, please state what your duties were with this company.

A. To superintend the design and manufacture of their trucks.

Q. 23. After going with the Peckham Motor Truck and  
17 Wheel Company, when and under what circumstances, if at all, did you again hear of the type of truck above described by you and of which you were shown a photograph?

By Mr. WARFIELD: Objected to as calling for hearsay testimony.

A. In the spring or early summer of 1897, Mr. Peckham informed me that the Consolidated Traction Company were about to purchase some cars or trucks, and that Mr. Young, wishing to maintain a standard in his equipment, would accept bids only on trucks similar to those last furnished him by the J. G. Brill Company.

Q. 24. What Mr. Peckham was this?

A. Edgar Peckham, president of the Peckham Motor Truck and Wheel Company.

Q. 25. And was the Consolidated Traction Company the same company for which you had previously worked?

A. Yes.

Q. 26. What further, if anything, did Mr. Edgar Peckham say to you about the trucks?

By Mr. WARFIELD: Same objection, as hearsay, and further notice of general objection to this entire line of testimony as incompetent and irrelevant to affect in any way the defendant, in any issue of this suit.

A. He instructed me to examine the truck furnished by Brill, with a view to bidding to the Consolidated Traction Company, on furnishing similar trucks.

Q. 27. What did you do as a result of these instructions?

A. I visited the shops of the Consolidated Traction Company, and there consulted with the master mechanic relative to what parts should be interchangeable between the trucks, made measurements of such parts, and had gotten up a design for a truck similar to the one I had inspected. This design, as originally submitted to Mr. Peckham, did not include the spiral springs supporting the ends of the elliptic springs. This feature of a spiral spring support for the ends of the elliptic springs was insisted upon by Mr. Peckham, as later inserted by me in my patent, No. 635,986.

Q. 28. Where are the shops of the Consolidated Company located?

A. In the city of Newark, N. J., on the Newark plank road, about a quarter of a mile east of its junction with Chappel Street.

Q. 29. Where was the Peckham Motor Truck and Wheel Company located?

A. At Kingston, N. Y.

Q. 30. To what extent did you examine the trucks themselves at this time of your visit to Newark, N. J., and which were then in use by the Consolidated Company?

A. I examined them in every detail. As I have before stated, I made measurements of certain parts which it was intended to have interchangeable in the trucks manufactured by the J. G. Brill Company, and those proposed to have manufactured by the Peckham Motor Truck and Wheel Company.

18 Q. 31. Could you identify a photograph or drawing of the trucks which you examined as you have just stated at Newark, N. J.?

A. Yes.

Q. 32. I direct your attention to the photograph which you examined once before this morning, and will again ask you to state what it is.

A. The photograph No. 1134 which you hand me is in all essential details a photograph of one of the trucks examined. There are, however, some minor points about the details of castings, and the shape of the semi-elliptic springs which lead me to believe that this particular photograph was made from one of a later batch of trucks furnished to the Consolidated Traction Company, by the J. G. Brill Company. I am able to identify this as a photograph of a truck built for the Consolidated Traction Company by the maker's mark on the wheels used in the truck.

(The photograph identified by the witness is offered in evidence to be marked by the notary with the title of this cause and the designation: "Complainant's Exhibit, Photograph of Type of Truck Examined by Uebelacker at Newark.")

By Mr. WARFIELD: Introduction of this exhibit is objected to as incompetent and irrelevant from any standpoint of this cause and particularly as in nowise connected with the defendant company.

Q. 33. I now call your attention to the blue print drawing and will ask you to state if you can identify it, and if so, to state what it is.

A. I have no means of identifying the drawing A-32, 35, shown me.

Q. 34. Will you state how the trucks, shown in this drawing, compare with those you examined at Newark, as you have above related?

A. The side view of the truck, shown in the drawing A-32, 35, is similar to the truck I inspected at Newark.

(The blue print drawing shown the witness is offered in evidence to be marked, "Complainant's Exhibit, Blue Print Examined by Uebelacker.")

By Mr. WARFIELD: Same special objection as above.

Q. 35. With respect to the spring system of the trucks shown in the exhibit photograph and blue print which you have examined, please state how they compare with that of the trucks you examined at Newark at the time you have stated.

A. The spring system, shown in the photograph 1134 and in the drawing A-32, 35, is the same as that in the truck I examined at Newark.

Q. 36. Will you briefly state what distinguishing feature, if any, there was about the spring system of these trucks?

A. A semi-elliptic spring lying in the same plane as the side frame supported at its ends through spiral springs, and links supported by the side frame by means of a ball and socket joint.

Q. 37. What was the object of this ball and socket joint as you then understood?

A. To permit a movement of the links in the same plane as that occupied by the side frame; also, to permit a movement of the links in the plane at right angles from that occupied by the side frame. The first movement was made necessary by the lengthening of the semi-elliptic spring under compression; the second movement was to provide for the transverse swing of the car body and truck bolsters.

Q. 38. What was the result of this trip of yours to Newark?

A. I later received instructions to build an order of trucks for the Consolidated Traction Co., as shown in the design which I have before mentioned I had made up at Kingston after inspecting the Brill truck at Newark.

Q. 39. From whom did you receive these instructions?

A. I would not be sure whether these were received in the form of verbal instruction- from Edgar Peckham, or whether they came through as a regular formal order from the Consolidated Traction Co.

Q. 40. What did you do as a result of these instructions to build and ship these new trucks to the Consolidated Co.?

A. I built them and shipped them to the best of my recollection in the fall of 1897.

Q. 41. About what time did you start upon the designs and plans for these trucks which you built and shipped as you have just stated?

A. To the best of my recollection in May or June, 1897.

Q. 42. Can you produce any drawing, cut or illustration of the trucks which you so built and shipped to the Consolidated Traction Company of New Jersey?

A. No.

Q. 43. I call your attention to a cut which I now hand you and will ask you if you can identify the illustration therein, and if so to state what it is.

A. The cut labeled "Jersey Special No. 16," which you hand me, is an illustration of the truck which I built for the Consolidated Traction Company, and to which I have previously referred.

(The cut identified by the witness is offered in evidence to be marked "Complainants' Exhibit, Cut of Truck Built by Uebelacker and Shipped to the Consolidated Traction Company of New Jersey.")

By Mr. WARFIELD: Same special objection as to incompetency and irrelevancy in this suit.

Q. 44. How many trucks were comprised in this initial order of 1897?

A. I do not remember.

Q. 45. Could you state approximately?

A. To the best of my recollection between twenty and thirty pairs.

Q. 46. How were these trucks, which you so built and shipped to the Consolidated Traction Company, to compare in construction with those which they had purchased of the J. G. Brill Company?

By Mr. WARFIELD: Objected to as indefinite and ambiguous.

A. Do you wish a comparison as to design, workmanship, or what?

Q. 47. In the general design and results to be accomplished.

A. They were similar to the Brill truck furnished, only in having the bolster supported by a semi-elliptic spring lying in the same plane as the side frame, and in having a single bar for a  
20 bolster connecting the semi-elliptic under the two side frames, which bar was not designed to carry any of the weight of the car body at its center.

By Mr. WARFIELD: Defendant's counsel give notice that complainants' counsel, having persisted in the above questions Nos. 46 and 47, notwithstanding objections thereto, which were intended to apply to both parts of the question, it being now for the first time apparent that the stenographer has given two numbers to the above question, request for information by the witness and answer by complainants' counsel, the answer thereto is binding upon complainants and will be insisted as such.

Q. 48. In the type of trucks as shown by the cut which you identified, what movements are permitted to the elliptical springs?

A. In the truck shown by the cut labeled "Complainants' Exhibit, Truck Shipped to Traction Co., etc.," the arch of the semi-elliptic spring was flattened, so that it would not lengthen when compressed, the links supporting the ends of the elliptic spring were permitted to move freely in a plane at right angles only to that of the side frames.

Q. 49. How did the construction of these trucks which you built and shipped to the Consolidated Traction Co., while with the Peckham Motor Truck and Wheel Co., compare with Fig. 1 of your patent No. 635,986, so far as the spring system in general was concerned, a printed copy of which patent I now hand you.

A. In the trucks shipped to the Consolidated Traction Co., the top of the link supporting the semi-elliptic springs was formed into a T head which rested in a socket cast in the upper face of the washer resting on the top of the spiral spring supported by the side frame. This T head and the shape of the aperture in the above-mentioned washer, through which the links pass, permitted the movement of this link only in the plane at right angles to that occupied by the side frame. The semi-elliptic spring supported at each end by these links was made flatter than is shown in the plate which forms a part of the patent No. 635,986 in order that the flexure of this spring might not materially alter its length and thus put a strain on the T heads of the links supporting it, due to forcing them to move in the same plane as occupied by the side frames.

Recess.

Q. 50. By what name were the trucks known which you designed, built and shipped as you have stated to the Consolidated Traction Company of New Jersey?

A. No. 16.

Q. 51. You have described in connection with the trucks which you so shipped in 1897 to the Consolidated Traction Company of New Jersey, the transverse movement of the springs; please state whether or not a longitudinal movement was also possible, and how it was obtained?

A. Longitudinal movement on account of the flat shape of the semi-elliptic spring was negligible; if there was any longitudinal movement, it could only have been taken up by the lost motion of the joints between the links and the washer supporting the head of it or by the uneven flexure of the coil springs between the side frames and the washer supporting the head of the link.

Q. 52. How did you come to file application which eventuated in patent No. 635,596?

A. During the spring or summer of 1897, I made my first attempt to design a truck which would take the motors between the axle and the bolster and still have comparatively short wheel base. To narrow down the bolster as much as possible and thus permit the motors to come together as close as possible, I adopted the form of bolster made of one single bar set on edge shown in patent No. 635,986. As the motors occupied the space immediately under the bolster and transoms which are the parts shown in the drawings accompanying the above patent, as Nos. 24 and 40, I adopted the semi-elliptic spring located under the side frame, as a means of suspending the bolster, rather than the old plan which involved a spring plank lying transversely with the truck under the bolster, upon which the spring system supporting the bolster is usually carried. The use of this

spring plank would have involved the separation of the motors and consequently the lengthening of the wheel base of the truck by an amount equal to the width of the spring plank. It was with the view to shortening the wheel base of the truck with inside-hung motors that I made the design covered by patent No. 635,986, and this design was known as the No. 15 truck, a few of which were actually built and sold. This type of truck was entirely superseded when a little latter I designed No. 14-B with the motors hung outside of the axles.

Q. 53. At whose request did you file the application for this patent No. 635,986?

A. At the request of Mr. Edgar Peckham.

Direct examination closed.

Cross-examination.

By Mr. WARFIELD, without waiver of objections as to competency and pertinency so far as defendant company is affected:

X Q. 54. Mr. Uebelacker, are you here under subpoena or voluntarily?

A. Voluntarily.

X Q. 55. You are not here then under compulsion or as a witness hostile to complainants?

By Mr. AMES: Objected to as irrelevant and inadmissible, and further as calling for legal conclusion as to the technical term "hostile."

By DEFENDANT'S COUNSEL: It appears quite pertinent that the court should know what the attitude of the witness is.

A. No.

X Q. 56. Referring to your testimony as to the purchase or intended purchase by Mr. Young of trucks from the Brill Company, in February, 1897, can you state what was the point particularly desired or sought for in those trucks?

A. The short wheel base feature.

22 X Q. 57. You have been asked as to a "peculiar type" of short wheel base trucks. Limiting, for the purposes of this question, this term "peculiar type" to the design of truck furnished by the Brill Company on that first order from the Traction Company, please state whether this type of truck has been a commercial success and gone into extensive use as a short wheel base truck.

By Mr. AMES: Objected to as not proper cross-examination, and the witness is instructed not to answer the question.

By DEFENDANT'S COUNSEL: The instruction of defendant's counsel exceeds his powers. The question is obviously founded purely upon direct examination.

By Mr. AMES: Instruction to the witness is, of course, intended to apply only until the court shall have an opportunity to pass upon the propriety of the question. Until that time the instruction is insisted upon.



A. I do not know. I never built but one more batch myself, and do not know whether the Brill Company built more or not.

X Q. 58. The truck shown in photograph marked "1134" and offered as an exhibit in the case as "photograph examined at Newark, etc.," has inside-hung motors, has it not?

A. The truck shown in photograph in No. 1134 provides space for but one inside-hung motor. There is not room between the axles to place two motors. It was designed entirely for an inside-hung motor.

X Q. 59. You have had an extended experience with trucks and truck construction?

A. I had five years' experience with the Consolidated Traction Company in the maintenance of trucks, and a little over two years with the Peckham Motor Truck and Wheel Company in the manufacture and design.

X Q. 60. Do you know whether short wheel base trucks, in so far as they have been used, have been generally equipped with an inside-hung motor or motors, or an outside-hung motor or motors?

By Mr. AMES: Objected to as not proper for cross-examination.

A. The greater number of the so-called short wheel base trucks have been equipped with outside-hung motors.

X Q. 61. Do you consider from a practical standpoint the hanging of the motors outside instead of inside the axles an important or unimportant difference of construction?

By Mr. AMES: Objected to as not proper for cross-examination.

A. The advantage gained by hanging the motors outside the axle in a short wheel base truck is that thereby space is obtained between the wheels sufficient to accommodate a bolster of sufficient stiffness to carry the weight of the car body on the swivel plate instead of on the side bearings. With the car body so carried, the frictional resistance to the turning of the truck under the car body in rounding a curve is very much reduced, and this is the main advantage gained by placing the motors outside of the axles rather than between them. In addition to the above, as I mentioned

23 before, there is not space enough between two axles four feet apart to hang two motors, as the motors with their suspension take up from the center of the axle to the nose of the motor from twenty-six inches upwards each. The limitation of the wheel base to four feet as a specific figure is owing to the fact that this is about the minimum which will provide space for thirty-three-inch wheel and a brake rigging located between the wheels. It is also about the minimum which, in ordinary practice, it is considered safe to run on a gauge of four feet eight and one-half inches.

X Q. 62. You wish your answer to cross-question 61 then to be considered as meaning that this difference is an important one, do you?

By Mr. AMES: Same objection.

A. I consider the difference very important.



X Q. 63. What was the wheel base of the truck shown in photograph 1134, "Photograph Truck, Examined at Newark, etc."?

A. I do not recall the exact wheel base. It was in the neighborhood of four feet.

X Q. 64. When Mr. Young first asked you your opinion relative to the merits of this truck, what did you tell him?

By Mr. AMES: Objected to as irrelevant and inadmissible.

By DEFENDANT'S COUNSEL: The question referred to is to question 13.

A. I criticised the truck as being open to the same objections as the Brill Maximum traction truck, a larger number of which we then had in service on the road, namely, that the weight of the car was carried on side bearings distant nearly as far from the center upon which the car is swiveled as were the flanges of the wheels which had by their thrust against the rail to furnish the pressure to turn the truck under the car in rounding the curve. I repeated to him the experience which he had had with derailments of the Maximum traction type of truck, and expressed my belief that we would experience the same difficulty with the type shown in the photograph, as it was likewise a side-bearing truck, whereas the proper principle was to make the truck center-bearing.

X Q. 65. I believe that upon close examination of the "Photograph 1134 Examined at Newark, etc." you decided from the wheel markings that this was a photograph of a later truck and not a photograph of one of the trucks of the first traction company Brill order as to which you are testifying.

A. I used the marks on the wheels only to identify the truck as one built for the Consolidated Traction Company. I based my opinion that the truck was not one of the first order mainly on a center rib in the outside casting supporting the bolster on the semi-elliptic spring. My recollection of this casting in the truck which I examined is that there was no center rib in it and no perforations as shown in the photograph.

X Q. 66. You have stated in answer to question 19 that at the time of your conversation with Mr. Young you had no prior knowledge of a truck having the same or similar spring system as the Brill truck. Before you designed the truck for the Peckman Motor

Truck and Wheel Company, and before you saw Mr. Young  
24 with reference to the order for this Peckham Motor Truck and Wheel Company truck, did you have knowledge of a truck having the same or similar spring system?

A. Yes. The first double truck built by the Peckham Motor Truck and Wheel Company, and called their "No. 14," was just being turned out of the shop when I took charge. This truck had a bolster supported on a semi-elliptic spring located above the side frame, and resting on friction plates supported by the side frame. It was in the attempt to improve this truck and incorporate in it a swing bolster, which I deemed essential to easy riding, that I designed the "No. 15" truck, which was the subject of patent No. 635,986. To the best of my recollection, the original designs for this No. 15 truck were made before I had the conversation with

Mr. Young or Mr. Peckham relative to furnishing trucks to the Consolidated Traction Company, similar to those already furnished by the Brill Company, and prior to my examination at Newark of the Brill truck.

X Q. 67. Then the work of designing these trucks for the Peckham Motor Truck and Wheel Company was well under way for the purpose of improving one of their trucks designed before you entered their employ, before you knew anything about the Brill truck except in so far as Mr. Young had shown you a photograph. Is that correct?

By Mr. AMES: Objected to as not proper cross-examination, unless the inquiry be limited to the specific truck built by the Peckham Company, for the Consolidated Company, and concerning which the witness testified in the direct examination.

A. Yes, referring to the No. 15 truck.

X Q. 68. Prior to the time of your visit of inspection to Newark under Mr. Peckham's instructions, did you have knowledge of any other trucks, descriptions or drawings of trucks, having a spring system similar to the spring system of the Brill truck, of which you had seen a photograph? and if so, how did you acquire such knowledge?

By Mr. AMES: Objected to as not proper for cross-examination.

A. The only description or drawing of this nature which I recall is the Thyng patent and the drawing accompanying it. I undoubtedly had other descriptions, however, of the Brill truck with this class of spring suspension, as I ran across the Thyng patent in the course of an investigation in connection with the No. 15 truck. I presume that there had been at the time in question illustrations of this Brill truck published in their advertising matter. It is possible, however, that the Thyng patent came to light in the course of a preliminary investigation of the state of the art, when I first considered applying for a patent on the features of the No. 15 truck.

X Q. 69. At some time when these matters were in hand, then, you had an investigation made of the prior patents in the art, did you?

By Mr. AMES: Objected to as not proper for cross-examination.

A. Yes.

X Q. 70. For the purpose of knowing what your rights were so far as patents were concerned?

By Mr. AMES: Same objection.

25 A. Yes.

X Q. 71. And the Thyng patent to which you have referred was a United States patent?

A. Yes.

X Q. 72. Unfortunately we have no copy of that patent here for you to identify, and I will ask you to kindly state what in general the Thyng patent showed, if you remember.

By Mr. AMES: The question is objected to as irrelevant and as

inadmissible and as not proper cross-examination; in view of this impropriety the witness is instructed to decline to answer the question until the matter can be presented to the court and the propriety of the question determined.

By DEFENDANT'S COUNSEL: It is certainly highly pertinent and important that the court should be informed as to all the attendant facts and circumstances showing light upon matters referred to in witness's direct examination, and the attitude of complainants' counsel accordingly is based upon a desire to conceal the facts and mislead the court. Defendant's counsel insists upon the question.

By Mr. AMES: The only attitude which the complainants' counsel has is that the cross-examination shall be confined within something like reasonable limits, although this has been already far exceeded; if the explanation called for can be made brief, the instruction will be waived.

By DEFENDANT'S COUNSEL: The attention of the court is called to the above attempt on the part of complainants to obstruct the right of cross-examination and withhold from the court facts obviously important and pertinent, and it is not believed that complainants' counsel should ask that the witness's testimony should be necessarily brief under the circumstances.

A. The Thyng patent showed a four-wheel swivel truck composed of wooden wheel pieces with pedestals bolted thereto, a bolster arranged to carry the weight of the car body at its center and supported at each end by a semi-elliptic spring lying below the wheel piece and suspended from the wheel piece by links arranged to permit transverse motion of the bolster.

X Q. 73. These semi-elliptic springs were in the plane of the wheel piece.

By Mr. AMES: Same objection.

A. In the same plane as the wheel piece. I might mention in explanation of the use of the term "wheel piece," that this is the name used in the wooden frame truck for the upper horizontal member of the side frame.

X Q. 74. This Thyng truck had a swing bolster?

By Mr. AMES: Same objection.

A. Yes.

X Q. 75. Were the ends of the semi-elliptic springs supported near the axle boxes?

By Mr. AMES: Same objection as to this whole line of examination.

A. Yes.

26 X Q. 76. Please give as near as you can remember the date of issuance of this patent.

A. 1848.

X Q. 77. Did you know of this Thyng patent at the time you made the visit of investigation to the shops of the Traction Company, as stated in your answer to question 27?

By Mr. AMES: Objected to as not proper cross-examination.

A. Yes, I had a copy of it in my pocket.

X Q. 78. Did you at that time know of any illustration or construction of a semi-elliptic supporting spring and a spiral spring for supporting the ends of the semi-elliptic, apart from the "Photograph No. 1134"?

By Mr. AMES: Same objection.

A. Yes, I unearthed in the same investigation which brought to light the Thyng patent a carriage spring patent which showed several methods of supporting the end of a semi-elliptic spring through a coil spring. I had this patent also with me at the time I made the inspection of the Brill truck at Newark. I do not recall the name of the patentee nor the number of this patent.

X Q. 79. Did you consider, as a practical man in the art, that the combination of a semi-elliptic and coil spring for supporting the weight of a carriage body was the same as the combination of a semi-elliptic spring and coil spring for supporting the weight of a car body?

By Mr. AMES: The question is objected to as irrelevant and as inadmissible, and as not proper cross-examination.

A. Yes.

X Q. 80. And you are still of the same opinion?

By Mr. AMES: Same objection.

A. Yes.

X Q. 81. Was your object in visiting the shops of the Traction Company, as stated in your answer to question 27, apart from your desire to make measurements as to matters of design and size of parts, to copy the Brill truck or to make sure that you were not appropriating any of the distinctive features thereof?

By Mr. AMES: Objected to as irrelevant and as inadmissible.

A. Frankly, my instructions and my object were to make as nearly as possible a copy of the Brill truck. After consultation with the master mechanic, this was altered in many important features, and Mr. Young's objections to such alteration overcome.

X Q. 82. You wanted to know all about the Brill truck because Mr. Young had adopted that style and insisted upon some of the features; is that right.

A. Yes.

X Q. 83. And I believe you have testified that the truck which you finally built as a result of all the information you had at hand was similar to the Brill truck only in the location of the semi-elliptic spring and in the character of the bolster.

A. Yes.

27 X Q. 84. And so far as the location of the semi-elliptic springs and supporting a holster at its ends upon said semi-elliptic springs was concerned, the truck which you finally built was also similar to the truck shown in the Thyng patent, was it not?

By Mr. AMES: Objected to as irrelevant and as not proper cross-examination.

A. Yes.

X Q. 85. While you were with the Peckham Motor Truck and Wheel Company, did you know of any construction put out by them or designed by them, whether used for supporting the load of a car body or the load of a motor involving the link, supported from the frame by a ball and socket joint, and having a spiral spring for cushioning the weight which it carried?

By Mr. AMES: Same objection.

A. I do not recall any such construction.

X Q. 86. I ask you the same question with reference to a link passing up to a point of support on the frame, with a spring or cushion between the upper end of the link and frame and the T head above the cushion.

By Mr. AMES: Same objection.

A. I do not recall any such arrangement except that in the No. 16 truck, and the somewhat similar device of a short pin passing through a hole in the upper end of the link which was later substituted in the No. 14-B-3 truck for the T-headed link used in the No. 16.

X Q. 87. In the Brill truck as to which you have testified, the links supporting the ends of the semi-elliptics were allowed a free swing in all directions, were they not?

A. As far as the links themselves were concerned, yes. The movement of the bolster, however, was limited longitudinally by jaws or guides on the side frames.

X Q. 88. In the trucks which you designed and had built for the Peckham Motor Truck and Wheel Co., in how many and in what directions did the links have a free swing?

A. Transversely only.

X Q. 89. State, if you know, the practical effect of the use of a device such as that shown in the Brill photograph 1134, in so far as it embodies a metal side frame and a metal link having a ball head seated in such side frame.

A. With the high arched semi-elliptic spring used by the Brill Co., this construction permitted the links to spread apart longitudinally at the bottom to allow for the increased distance between the supported ends of the semi-elliptic spring as it settled under weight.

X Q. 90. What was the effect of the metal to metal contact at the point in question?

By Mr. AMES: Objected to as irrelevant.

A. I could not answer this question from personal observation, as I do not recall ever having seen one of these ball and socket joints apart.

X Q. 91. Do you know, as a matter of fact, whether the truck similar to the truck of photograph No. 1134, as generally put out by the Brill Co., has been equipped with this style of link support or a different one?

By Mr. AMES: Objected to as not proper cross-examination.

A. The trucks later put out by the Brill Co. with this style of spring suspension had a stirrup over the side frame, resting on a saddle over the side frame, instead of the ball and socket link. I first saw this construction myself in 1898.

X Q. 92. And has it been their general style of construction since then.

By Mr. AMES: Same objection.

A. It has been their general style of construction since then.

X Q. 93. In the latter construction, is there any provision for longitudinal movement?

By Mr. AMES: Same objection.

A. None at all.

X Q. 94. Is it a usual or unusual thing for truck builders, when there is an order pending from some particular company, to send a man to the shops of that company to make measurements and copy the trucks which the company has on hand for purposes of comparison, and as a basis of information as to the trucks to be built?

A. I should hate to say that such a proceeding was usual; however, I know of it being done in two other instances.

X Q. 95. May there have been any more than two of such instances?

A. Yes.

X Q. 96. Referring to the Brill trucks which you inspected and the Peckham trucks which you built, were there any features of construction common to the two trucks which you did not believe at the time you built the Peckham trucks to be also common to the prior art in accordance with the investigation to which you have referred?

By Mr. AMES: Objected to as irrelevant and inadmissible and as improper cross-examination.

A. Yes, I believed the principle of supporting the ends of the semi-elliptic spring through spiral springs to be subject to the carriage spring patent which I have previously mentioned. As this patent, at that time had still some years to run, I recommended to Mr. Peckham that he obtain a license to manufacture under this patent. I believe that he never did obtain such a license. I did not regard the spring arrangement of the Brill truck as anything new in the art in view of the Thyng and carriage spring patent above referred to. To the best of my recollection, the patent obtained by Brill on his form of construction was not issued until a year or more after the date of the construction by the Peckham Motor Truck and Wheel Co. of the No. 16 trucks for the Consolidated Traction Co. My recollection is that Brill's patent was in interference with my application which resulted in patent No. 635,986, during the summer of 1898, and I filed the application for this patent in October, 1897.

X Q. 97. Perhaps I did not make my question clear. My mean-

29 ing was, did you use anything, whether detail of construction or principle of construction of the Brill truck, except such as you thought you were justified in using by the prior patents developed by your investigation?

By Mr. AMES: The same objections, and further as having been already asked and answered in the prior question and answer.

A. No.

X Q. 98. In still other words, to make it perfectly clear, you thought that you were not using anything which could by any possibility be considered patentable to Brill.

By Mr. AMES: Same objections.

A. I did not think that I was in any way infringing any patent right of Brill.

Redirect examination.

By Mr. AMES:

R. D. Q. 99. Who gave you the instructions to make as nearly as possible a copy of the Brill truck?

A. Edgar Peckham, president of the Peckham Motor Truck and Wheel Company.

R. D. Q. 100. Are you a patent lawyer or patent expert?

A. No.

R. D. Q. 101. In figure 5 of your patent No. 635,986 there is shown a form of truck, is there not, in which provision is made for the longitudinal as well as transverse movement of the elliptic springs?

A. Yes.

Redirect examination closed.

Recross-examination.

By Mr. WARFIELD:

R. X Q. 102. Do you know whether any trucks were ever built having provision for longitudinal movement in accordance with redirect question 101?

A. To my best recollection, there was only one truck built with this provision for longitudinal movement, and it was never run. In fact, I believe it was put up with unannealed castings solely for the purpose of getting a photograph for advertising purposes.

R. X Q. 103. You have had experience with inventions and patent matters from a practical standpoint, have you not?

A. No more than I could help.

R. X Q. 104. Have you ever known of the Brill Company, or any of its employees, having in their possession copies of working drawings of Peckham trucks, which came directly or indirectly from the Peckham shop?

A. No.

Deposition closed.

CHARLES F. UEBELACKER.



30 COUNTY OF COOK,  
*State of Illinois, ss:*

I, Andrew Hummeland, a Notary Public in and for said County and State, duly commissioned and qualified and authorized to administer oaths, and to take and certify depositions, do hereby certify that pursuant to the annexed notice issued and served in the civil cause depending in the Supreme Court of the District of Columbia, wherein John A. Brill and J. G. Brill Company are complainants and Washington Railway & Electric Company is defendant, in Equity No. 25,161, I was attended at the office of Messrs. Willard & Evans, No. 87 East Washington Street, Chicago, Illinois, by Robert Lewis Ames, Esq., counsel for said complainants, and by Warfield & Duell, counsel for said defendant, on the 24th day of July, 1905; that the afore-named witness, Charles F. Uebelacker, who was of sound mind and lawful age, was by me first carefully examined and cautioned, and duly sworn to tell the truth, the whole truth and nothing but the truth, in answer to such questions as might be propounded to them by the parties, or their counsel; and he thereupon testified as is above shown; and that the deposition by him subscribed, as above set forth, was taken down upon a type-writing machine, as given, by a competent and disinterested operator engaged by me, and was in my presence read over by the said witness, and signed by said witness, in my presence; and was taken at the place in the annexed notice specified and at the time as set forth; and that all was so done, written and signed in the presence of said counsel for said parties.

I further certify that the reason for taking said depositions was and is, and the fact was and is, that said witness lives beyond the District of Columbia; that I am neither counsel nor attorney for either party to said cause and am not in anywise interested in the event or said cause, and it being impracticable to deliver said deposition and the exhibits thereto attached with my own hand to the court for which it was taken, I have retained the same for the purpose of being sealed up and indorsed with the title of the cause and with the cost of taking the same and with the name of the person by whom said cost was paid, and by me transmitted to the court for which they were taken and to remain under my seal until there opened.

Witness my hand and seal at Chicago, Cook County, Illinois, this 24th day of July, 1905.

31 [SEAL] ANDREW HUMMELAND,  
*Notary Public in and for Cook County, Illinois.*

My fee for taking above deposition \$28.30 paid by Complainants.  
ANDREW HUMMELAND,  
*Notary Public.*

*Memoranda.*

For Complainants' Exhibit Photograph of Type of Truck examined by Uebelacker at Newark, see page 203 of this record.

Complainants' Exhibit Cut of Truck built by Uebelacker and shipped to the Consolidated Traction Co. of New Jersey, see page 4 of Street Railway Journal, page 193 of this record.

32

*Deposition for Complainant.*

Filed August 14, 1905.

Supreme Court, District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL & J. G. BRILL Co.

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

Messrs. Warfield & Duell, 220 Broadway, New York, N. Y., Solicitors for Defendant.

GENTLEMEN: Please take notice that I shall proceed with the taking of Complainants' proofs in the above entitled case at my office, 206 Broadway, New York City, Borough of Manhattan, on Wednesday, July 26th 1905, at 11 A. M. before John A. Shields Esq., Special Examiner.

Respectfully,

JOSEPH L. LEVY,  
*Of Counsel for Comp's.*

New York, July 24, 1905.

Service admitted July 24/05.

Subject to convenience of undersigned, since notice is not timely & undoubtedly improper in view of Chicago testimony.

WARFIELD & DUELL,  
*Defendant's Sol's.*

Supreme Court, District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL & J. G. BRILL Co.

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

33

No. 206 BROADWAY, ROOM 8,  
NEW YORK, *July 26, 1905.*

Testimony Taken and Proceedings Had on Behalf of Complainants,  
Pursuant to Notice, Before John A. Shields, Esq., United States  
Commissioner, at the Office of Joseph L. Levy, Esq., as Above,  
Commencing Wednesday, July 26, 1905, at 11 O'clock A. M.

Present: Francis Rawle, Esq., for Complainants; Messrs. Warfield  
& Duell, for Defendant.

O. ELLERY EDWARDS, JR., a witness called on behalf of the com-  
plainants, being duly sworn, testified as follows:

Direct examination.

By Mr. RAWLE:

Q. 1. State your age, residence and occupation.

A. Age, 31 years; residence, Brooklyn, N. Y.; occupation, lawyer  
and patent solicitor.

Q. 2. What experience have you had in the employment of the  
United States Patent Office?

A. I was appointed an assistant examiner in the United States  
Patent Office early in 1896, and I continued in this capacity for more  
than six years, resigning my position in 1902. While I was employed  
in the Patent Office, it was my business to examine applications for  
letters patent in various classes and sub-classes, to determine the state  
of the art relative to such applications. The conditions under which  
I worked necessitated a knowledge of a general kind of the classifica-  
tion of the Patent Office and the location of patents in the sub-  
classes.

Q. 3. State in what classes and sub-classes railway trucks are classi-  
fied.

A. Railway trucks are classified in the class of "railway rolling  
stock," the number of the class being 105. In this class, 105, the  
various sub-classes relating to railway trucks are as follows:

32. Trucks.

135. Anti-friction wheels.

103. Bolsters.

104. Cast.

105. Guides.

106. Pressed steel.

107. Trussed.

- 257. Cable grip.
- 108. Center bearings.
- 109. Pressed steel.
- 11. Changeable gauge.
- Curve adjusters.
- 34 136. Swiveled wheel.
- Electric motor.
- 239. Bogies.
- 240. Equalizing levers.
- 241. Motor supporters.
- 242. Rigid frame.
- Four-wheel.
- 243. Bogies.
- Curve adjusters.
- 137. Axles, radial.
- 138. Axles, sectional.
- 111. Frames.
- 112. Pressed steel.
- 113. Pedestals.
- 114. Safety supporters.
- 115. Side bearings.
- Six-wheel.
- 244. Bogies.
- Curve adjusters.
- 139. Axles, radial.
- 245. Supplemental.

Q. 4. How long has this classification which you have given been in use in the Patent Office?

A. I consulted the records yesterday, and find that it has been in use since early in 1896.

Q. 5. Continuously, without change in this class and these sub-classes?

A. So far as I could find, it has not been changed since that date.

Q. 6. At what stage in the life of a patent is it distributed into its class?

A. When an application is filed in the Patent Office, it goes to the Chief Clerk's office, which distributes it according to its subject matter into one of several divisions. The application is then assigned to a person in the division who has charge of the sub-classes relating to its subject matter. He designates the class and sub-class to which the application belongs, and it is then marked accordingly. After the application becomes a patent, it is classified in the Patent Office in accordance with this marking of the application, where it remains.

Q. 7. What is the practice as to putting copies of all patents, properly classified, at the disposal of the patent solicitors who are making validity searches?

A. In the Patent Office there is a large room set apart for the use of attorneys making validity and other searches. In this room are a great number of shelves on which rest bundles of copies of patents,

which copies and bundles are arranged according to their subject matter and the classification of the Patent Office. These bundles are so marked and placed that they can readily be found by any person familiar with the Patent Office system of classification, and  
35 there are also officials of the Patent Office who are always willing and ready during office hours to assist any person in finding the copies of patents in any class or sub-class of the Patent Office.

Q. 8. State whether or not all the patents in a given sub-class are put together in a given bundle or bundles?

A. Such is the practice of the Patent Office, so that anyone anxious to make a search can always and easily obtain copies of all the patents within a sub-class.

Q. 9. Are these bundles or the shelves on which they rest marked in any way to indicate the sub-class to which the bundle belongs?

A. At the top of each row of shelves is an index card giving the class and sub-classes on the shelves under the card. This index card refers to each shelf by number, there being about fourteen shelves under each card. Each bundle rests between two thick cardboards, an upper and lower, the upper one being marked so as to indicate the sub-class or classes in the bundle, and also the number of the shelf on which the bundle belongs.

Q. 10. What is the regular practice with Patent Office officials searching references which may be pertinent to an application, and with patent attorneys making validity searches?

A. The Patent Office officials, in making searches on applications, search through the sub-class in which the application is to be classified, then through related sub-classes in the same class or in other classes, as may be deemed necessary.

Patent attorneys, in making searches against a patent, search through the sub-class in which the patent is classified, and also through related sub-classes in the same class. However, this is seldom sufficient for exhaustive searches, so that in addition it is also customary to search through sub-classes more remotely connected with the subject matter under investigation, and also to search through foreign patents and publications.

It is also common for examiners to search through such foreign patents as they may have in their private digest, which are classified in a manner similar to the one in which the United States patents are classified.

Q. 11. Returning to the physical condition of the copies of patents in these classified bundles, state how they are as to patents issued during the last ten years.

A. Since, at least, 1894, it has been the invariable custom of the Patent Office to especially prepare identical copies for the attorneys' room and for the examiner's digest. The attorneys' room copies are made by having copies of the drawing struck off on extra heavy paper and on the backs of these drawings are secured one sheet of the printed specification. For example, if there are six sheets of drawings and six pages of specification, one page of specification will be on the back of each sheet of drawings. If there are eight pages of speci-

fication and six sheets of drawing, a page of specification is pasted on the back of each sheet of drawing and an additional card of uniform size with the drawings is inserted and a page of specification would be pasted on each side of the card.

In the bundle each patent is a complete entity, and is not secured to any other patent, so that each patent may be taken out and examined individually.

Q. 12. I call your attention to the two Brill patents here in suit, numbered 627,898 and 627,900, patent to L. B. Thyng, 4276; the patent to Davenport and Bridges, reissue No. 183.

Patent to Overbagh, No. 104,876.

Patent to Buck, No. 112,897.

Patent to Beach, No. 173,257.

Patents to Brill and Curwen, Nos. 610,118 and 610,119.

All of which letters patent are exhibits in this cause.

Please state the classes and sub-classes in which those respective letters patent are classified, and have been since 1896, in the United States Patent Office, or since their dates of issue, respectively.

(Objected to as incompetent and immaterial. Defendant's counsel has waited patiently through the deposition of the witness as thus far given to see if anything material or competent to any of the issues in this case would be developed, and now objects to the entire deposition as thus far given, on the above grounds.)

A. All of these patents are classified, and are to be found in class 105, "Railway Rolling Stock," and they are also classified under the sub-classes of "Trucks," mentioned in my answer to question 3.

The Brill patents here in suit numbered 627,898 and 627,900 are classified in sub-class No. 239, "Trucks, Electric Motor, Bogies."

The said patents to Thyng, Buck, Davenport and Bridges, and Beach, are classified in sub-class No. 243, "Trucks, Four-wheel, Bogies."

The said patent to Overbagh is classified in sub-class No. 240, "Trucks, Electric Motors, Equalizing Levers."

I do not remember the exact sub-class in which the Brill and Curwen patents are classified.

The Brill patents above mentioned were classified in the classes where they are now to be found as set forth above, at the time these patents were issued.

The Thyng, Overbagh, Buck, Beach and Davenport and Bridges patents were classified as set forth above at least as early as 1896, and have not been changed since, according to the records of the Patent Office, which I personally examined.

Q. 13. Can you state when, for the first time, in relation to the case of Brill against the North Jersey Street Railway Company, the patents to Buck and to Overbagh were brought into the case?

(Same objection.)

A. These patents first came into that case after the case had been decided by Judge Bradford on final hearing and formed the basis of a motion for a petition for rehearing.

Q. 14. State, if you know, whether the patents to Davenport and Bridges, and Beach, were in that case at any stage.

37 (Same objection.)

A. They were not.

Q. 15. State, if you know, when these patents to Davenport and Bridges, and to Beach were first produced on behalf of the defendants in any suit brought by John A. Brill on the letters patent here in suit.

(Same objection.)

A. The Davenport and Bridges, and Beach patents were first produced by the defendants in opposition to a motion for preliminary injunctions against the Peckham Manufacturing Company and the Peckham Motor Truck and Wheel Company in the Circuit Court of the United States for the Southern District of New York before Judge Lacombe.

Q. 16. State whether or not you are familiar with these two litigations.

A. I am familiar with these litigations.

Q. 17. Defendant's witness, Lewis M. Sanders, has testified that he was the special examiner in charge of the applications for the Brill patents here in suit, and in respect of the finding the four patents above mentioned, the patents to Davenport and Bridges, Overbagh, Buck and Beach, he testified in this case that his Patent Office duties were very onerous, and that he was much driven; please state whether or not Mr. Sanders could have made a search against the applications of the Brill patents here in suit without searching in the sub-classes in which you have testified that the patents to Davenport and Bridges, Beach, Overbagh and Buck are to be found.

(Objected to as incompetent and immaterial, and further as leading.)

A. At the time the patents in suit were pending before the Patent Office as applications, it would have been impossible for an assistant examiner making a good search against these applications not to search through the sub-classes in which the patents you mention in your question are classified. In making this search it would be his duty to see and consider these patents as well as all others in the sub-classes to which they belong.

Q. 18. Do you know in what class the patent to Haskins No. 330,023 is to be found, or whether it is in class 105 or not?

(Objected to as incompetent and immaterial.)

A. I looked up the classification of this patent late in 1903, and at that time this patent was classified in the class of "Carriages and Wagons," the class being numbered 21. I do not remember the sub-class in which it was classified.

Q. 19. State whether or not patents for motor supports in electric street railway trucks are in class 105?

(Same objection.)



A. I have no exact recollection on this subject. However, by referring to the official classification of the Patent Office, which I hold in my hand, I find that the class numbered 241, "Motor Supporters," is found in class 105, "Railway Rolling Stock." Exactly what this sub-class contains, I do not know.

38 Q. 20. State whether or not locomotives are in any of the sub-classes of class 105 which you have given in your answer to question 3.

(Same objection.)

A. They are not.

Cross-examination.

By WARFIELD & DUELL, without waiver of objections:

X Q. 21. In what classes were you engaged in the examination of applications for letters patent during your employment in the Patent Office?

A. The field of search in which I made examinations while I was an assistant examiner in the Patent Office included about the entire Patent Office, as near as I can now recollect.

X Q. 22. Name the several examining divisions in which you were assigned for the examination of letters patent during such employment.

A. I was employed in divisions 14 and 32.

X Q. 23. Was the examination of applications relating to trucks conducted in either of the above divisions?

A. It was not, except that trucks might be incidentally shown in connection with other machinery.

Recess until 2 P. M.

After Recess.

X Q. 24. Then, during your employment in the Patent Office, you were not assigned to a division wherein applications relating to trucks or railway rolling stock were regularly examined?

A. I was not.

X Q. 25. State whether or not attorneys, in making searches in the room assigned for that purpose, have free access to the bundles or packages of references which you have described as being located on shelves or in pigeon holes.

A. If by "references" you mean copies of patents, I should answer your question "yes."

X Q. 26. Are attorneys allowed to remove the bundles or packages of references, or copies of patents from their respective shelves for the purposes of searching?

A. Yes.

X Q. 27. Where is such searching conducted?

A. These bundles are taken by attorneys to tables especially made for the purpose, and the searches are generally made at the tables.

X Q. 28. Do you think it would be possible for an attorney to get

copies of patents or references from one of the bundles or packages mixed in with the copies in other bundles?

A. It is possible, but exceedingly improbable, because it is greatly to the interest of all who use the said copies to have the bundles complete, and so the attorneys are careful to restore any copies which they may take from the bundles during the examination. In  
39 addition to this, the employees of the Patent Office in the attorneys' room, who have charge of these bundles, are also careful to see that all copies are in the bundle when it is restored to its shelf.

X Q. 29. Are these several bundles examined by the employees of the Patent Office to see if all the copies of the patents are present in the said bundles, according to the office classification, before said bundles are restored to their respective shelves?

A. The bundles are examined from time to time, and the copies of patents are checked up on a list; but how often this is done I do not know.

X Q. 30. Can you state approximately how often this examination is made?

A. I cannot.

X Q. 31. Can you state whether or not this examination is conducted as often as once a year?

A. I cannot.

X Q. 32. Do you think it possible that copies of patents may be missing from the bundles for a certain period of time before their absence is discovered by the employees of the Patent Office?

A. Yes, I think it is possible.

X Q. 33. Do you know, as a matter of fact, that the bundles of copies of patents referred to are sometimes not complete according to the office classification?

A. In the course of my experience, both in the Patent Office as an employee and outside of it as an attorney, which experience has extended since early in 1896, I have known of one or two instances in which this has happened. I only know of one case which I can now recall, and I have also heard of one case.

X Q. 34. You state that you know or have heard of at least two cases where copies were missing from the bundles. Can you state positively that all the copies were present in other bundles you have examined during the searches you have conducted since the conclusion of your service in the Patent Office?

A. I have always assumed that the bundles were complete, in making my searches, in which assumption I have followed the general practice. I have never compared all the patents in any bundle with the list of the patents that should be in that bundle.

X Q. 35. Do you know whether or not it is the custom of certain assistant examiners in the Patent Office to have an accumulation of copies of patents or references on their respective desks after they have used said copies during the examination they have made on applications pending in the office?

A. It is customary for assistant examiners to have such piles on their desk of copies of patents, which copies have been taken from

the examiner's private digest and not from the bundles in the attorney's room.

X Q. 36. Then when such copies are accumulated on examiners' desks a search could be made in the examiner's private files without discovering pertinent references, could there not?

40 A. I think not. The examiners who make the searches in their private digest make allowance for these missing copies, and if they do not know exactly what copies are missing, as is usually the case, it is customary to find out.

If attorneys make a search in the examiner's private files or digest, they also allow for these missing copies. I am speaking of competent attorneys making a search.

X Q. 37. If, however, such allowance is not made by either the examiner or the attorney, a search could be made on an application without the discovery of pertinent references, could it not?

A. Such a search could be made, but would not be a good search.

X Q. 38. Can you state whether or not patents have been inadvertently issued by the Patent Office?

A. I believe that patents have so been issued.

X Q. 39. Can you state whether or not applications are sometimes examined and pass to issue when there are references pertinent to the claims of said application present in other examining divisions and in other classes and sub-classes in the office?

A. Personally I know of only one such instance, and in that case the patent issued without regard to the newly discovered reference.

#### Redirect examination.

By Mr. RAWLE:

R. D. Q. 40. If an application is before a given special examiner and he has some patents from the files lying on his desk, is it not a fact that those are patents which he has recently examined and which he is familiar with?

A. I think that is substantially always the case.

#### Recross-examination.

By WARFIELD & DUELL, without waiver of objections:

R. X Q. 41. Do you mean to say that all the assistant examiners are familiar with the structures shown and described in all the classes and sub-classes under their charge?

A. I can only answer in a general way. Generally speaking, all assistant examiners are reasonably familiar with the subject matter of their classes, and know about where to find what is relevant. They do not know as a rule every detail of a patent in a sub-class unless they have especially read up that patent or acted on it while it was on application. Such detailed knowledge depends on the length of time the examiner has had the sub-class and the number of applications he has acted on. The time which an assistant examines applications in a class and sub-class is variable, and may be as much as thirty

years. An examiner becomes reasonably familiar with the subject matter of his classes after he has had the class a few months.

Deposition closed.

O. ELLERY EDWARDS, JR.

Sworn before me.

JOHN A. SHIELDS,

U. S. Commissioner, Co. N. Y.

41 Counsel for complainants offers in evidence a certified copy of the "Certificate of Incorporation of the Peckham Manufacturing Company." It is marked "Complainants' Exhibit, Peckham Manufacturing Company Charter."

Defendant objects to the offer of the charter referred to on the ground that it is incompetent and immaterial, and gives notice that the offer of this charter in evidence will be brought to the attention of the court for a ruling before marking this certificate of incorporation, the examiner is requested to certify this offer to the court for a ruling as to whether or not it is competent or material to any issue in this cause, such marking to be dependent upon the ruling of the court.

Complainants' counsel places upon the record the following extract from this charter, for the purpose of convenience:

"In addition to the foregoing purposes and objects, this corporation is organized for the further purpose of acquiring the property, rights, franchises and business of the Peckham Motor Truck and Wheel Company, a corporation duly organized and existing under the laws of the State of New York, and engaged in the same or a similar character of business to that which is to be conducted by this corporation."

Defendant's counsel objects to the extract above placed upon the record by complainants' counsel as being incompetent and immaterial, and the same notice as above is given.

Complainants' counsel offers in evidence the copy of the *Street Railway Journal* of May 3, 1902, as to advertising page thereof 157, and the same is marked "Complainants' Exhibit, S. R. J., May 3, 1902."

The above offer is objected to as incompetent and immaterial, and further that the publication of the said *Street Railway Journal* of May 3, 1902, has not been proved.

"Complainants' counsel offers in evidence a certified copy from the Patent Office of "An instrument of writing executed by Charles F. Uebelacker," dated August 4, 1897, and recorded in Liber G-56, page 125, being the assignment before issue of the letters patent to said Uebelacker which are an exhibit in this cause. The same is marked "Complainants' Exhibit, Uebelacker Patent Assignment."

Complainants' counsel offers in evidence a certified copy of the file wrapper of the Redeclaration of Interference between Uebelacker and G. M. Brill involving the application for the Brill letters patent in suit, and the same is marked "Complainants' Exhibit, Redeclaration Uebelacker-Brill Interference."

Defendant's counsel objects to the offer in evidence of the Uebelacker assignment and the copy of the file wrapper of the Redecclaration of Interference between Uebelacker and G. M. Brill, involving the application for the Brill letters patent in suit, on the ground that they are incompetent, irrelevant and immaterial.

42 CHARLES G. HENSLEY, a witness called on behalf of the complainants, being duly sworn, testified as follows:

Direct examination:

By Mr. RAWLE:

Q. 1. Please state your age, residence and occupation.

A. Age, 23; residence, No. 10 New York Avenue, Borough of Brooklyn; occupation, law clerk in the office of Joseph L. Levy, where I have been for the last eight years.

Q. 2. State whether or not, as such law clerk, you had knowledge at any time of a letter from Louis T. Pyott to Mr. Joseph L. Levy, dated June 19, 1901, which letter constituted a report on the test of certain Thyng trucks at the J. G. Brill Company Works, a copy of which letter in the record, following redirect question 169 of the examination of Mr. Pyott, I hand you.

(Objected to as immaterial and irrelevant.)

A. I have knowledge of that letter; I remember such a letter being received by Mr. Levy from Mr. Pyott.

Q. 3. Where is it now?

A. I have searched the letter files and all cases involving Brill matters, and I have failed to find the original of this letter. I have made several searches within the past month for this purpose.

(The examiner being present says that he sees no objection to the offer of the charter of the Peckham Manufacturing Company be marked for identification "J. A. S., Special Examiner," subject to the objection made by defendant's counsel to have the question certified to the court, and if the court rules that the offer is a proper one, then such paper is to be marked as an exhibit; and the request of defendant's counsel that the examiner certify this particular offer to the court is granted, and the examiner so certifies.)

(The above statement that the charter has been marked is stricken out.)

(The copy of the letter in the record following redirect question 169 is objected to as involving secondary evidence.)

Deposition closed.

CHARLES G. HENSLEY.

Sworn before me.

JOHN A. SHIELDS,

U. S. Commissioner, Co. N. Y.

JOSEPH L. LEVY, a witness called on behalf of the complainants, being duly sworn, testified as follows:

Direct examination.

By Mr. RAWLE:

Q. 1. State, if you are engaged in this case, and whether or not you have searched in your office for the letter mentioned by the last witness, which was addressed to you.

A. I have made a careful search in the files relating to the *Brill vs. North Jersey Street Railway case*, this case and other cases  
43 in my office on several occasions during the past several months, and have been unable to find the original Pyott letter.

Q. 2. State whether or not you were the patent attorney or solicitor who prepared and prosecuted the applications for the letters patent here in suit.

A. I am.

Q. 3. Have you read the testimony of the defendant's witness, Lewis M. Sanders, with regard to a conversation between him, yourself and George R. Simpson, principal examiner in the Patent Office, in whose examining division in the Patent Office these applications were examined?

A. I have.

Q. 4. State whether or not the witness, Mr. Sanders, correctly stated in that examination what took place at this interview.

(Objected to as being manifestly incompetent, as involving secondary evidence.)

A. It is not correct.

Q. 5. State whether or not a conversation took place between yourself and those two gentlemen in regard to these applications.

A. While a conversation between Mr. Sanders, Mr. Simpson and myself may have at some time taken place, there was no such joint conversation between Mr. Sanders, Mr. Simpson and myself about which Mr. Sanders testifies in answer to question 10 in his deposition on behalf of the defendant herein. It is a fact that, after Mr. Sanders, acting as the assistant examiner, immediately in charge of the applications for the Brill patents in suit, had rejected certain of the claims upon the Thyng and Haskins patents, I went to Mr. Simpson and discussed the propriety of the rejection with him. At this interview, which was the last interview with the principal examiner, Mr. Simpson, in that case, I discussed the question as to whether the rejection of the claims of the application was correct or not. I remember distinctly that Mr. Simpson's last and final words were as follows, viz: "Mr. Levy, I believe that Mr. Brill has made an advance in the art, and I will allow the claims." It is not a fact, as Mr. Sanders testifies, that at that interview with Mr. Simpson, nor at any other interview, "Mr. Levy requested Mr. Simpson to allow the claims and to let him take his chances in the courts to sustain them." I again state that Mr. Sanders was not present at any interview I had with Mr. Simpson in regard to the prosecution of

these applications. Mr. Sanders in his answer to question 10 refers to a reference to a conversation had with the examiner in charge of the applications contained in defendant's exhibit file wrapper and contents of the Brill patent 628,898 in suit. The file wrapper contains the following statement with regard to a large number of claims, including claims 13 and 81 of the above Brill patent, viz: "A reconsideration of claims [citing a number of claims] rejected on the Thyng and Haskins, No. 330,023 is respectfully requested in view of opinions expressed relative to another prior case filed by this applicant and one Curwen, wherein the same general subject matter is disclosed, relative to the novelty of these respective combinations by the examiner in charge at a recent interview." I wrote those words and they were contained in a paper filed by me in the Patent Office in the above-mentioned Brill application on or about the 25th day of March, 1898. This further refreshes my recollection that Mr. Sanders' statements contained in his deposition are entirely incorrect, and that my recollection of the same is correct.

(That part of the answer referring to a conversation between the witness and Mr. Simpson is objected to as involving hearsay evidence and therefore is incompetent.)

Q. 6. In answer to question 9, the same witness, Mr. Sanders, testified in this case (second paragraph of answer) substantially that the Buck patent and the patent to Davenport and Bridges and to Beach were never, according to his recollection, "considered in connection with the claims of either of the Brill application- in question while they were pending in the Patent Office. At any rate, they were not cited." What have you to say with regard to this?

A. Neither the Buck patent, the Davenport and Bridges patent, the Beach patent nor, I believe, the Overbagh patent, were cited by the Patent Office in connection with the above-mentioned Brill application. If Mr. Sanders intended to be understood as meaning that they were not cited because he had no opportunity to do so, I call attention to the fact that after the amendment, dated March 25, 1898, in the Brill application for the patent 627,898 in suit, there were several actions by the Patent Office on this application, during which time those patents could have been cited in connection with any one or more of the said claims had it been desired to do so. Also, if Mr. Sanders intended to be understood as meaning that through pressure of business, or from any other proper or justifiable cause, he failed to find these patents, and therefore did not cite them, I call attention to the fact, based upon my knowledge of these cases and my experience in and out of the Patent Office for a period of over twenty years, that the patents were within physical reach of anyone endeavoring to make the search, either in the attorneys' room or in the examiner's room, so classified and so interrelated with the class under which the Brill patents in suit can be found that it would be physically impossible for anyone competent to make the search to have overlooked them unless by design. I also call attention to the fact that the Buck and Overbagh patents were, unless



their absence is otherwise fully explained, physically contained within the separate boxes both in the attorneys' room, which is open to the public, and the examiner's room, which is accessible by courtesy of the examiner, from July, 1897, to October, 1903, when they were first introduced into the North Jersey case on the defendant's motion to reopen; and that as to the Davenport and Bridges and the Beach patents, they were likewise, unless otherwise explained, physically contained in their respective boxes in the examiner's and attorneys' rooms from July, 1897, when the Brill applications were filed, until December, 1903, when they were for the first time interposed in the defense against the Brill patent in suit on the motion for a preliminary injunction in the case of Brill *et al.* against the Peckham Mfg. Co. and the Peckham Motor Truck and Wheel Co. in the Circuit Court for the Southern District of New York.

(The above answer is objected to as setting forth questions of fact not within the witness's knowledge.)

Q. 7. State when the North Jersey suit was brought by J. A. Brill in the Circuit Court for the District of New Jersey?

A. It was, I believe, on the 17th of July, 1899, or some day during that month that the bill was filed against the North Jersey Street Railway Co. under the Brill letters patent in suit.

Q. 8. State the continuity of counsel between the interference contest between Uebelacker and Brill on the applications for the Brill patents in suit, and continued down through the North Jersey case.

(Objected to as incompetent and immaterial.)

A. Mr. J. E. M. Bowen prepared and prosecuted the application for the Uebelacker patent involved in the said interference. On the declaration of the interference in May, 1898, he was the attorney for the applicant Uebelacker, the invention having been, prior to that time, assigned to the Peckham Motor Truck and Wheel Co. Mr. Bowen prosecuted the interference between Uebelacker and Brill on behalf of the Peckham Motor Truck and Wheel Co. and Mr. Uebelacker to the termination of that interference. When the suit against the North Jersey Street Railway Co. was instituted, Mr. Bowen appeared either as solicitor or as counsel for the defendant, and personally conducted the cross-examination of complainants' witnesses. Mr. Bowen having become ill, temporarily suspended attendance on the case. He subsequently died, and Mr. Henry P. Wells took his place in charge of the defense. Mr. Wells put in all of the defendant's proof in that case. Mr. Wells subsequently became ill, and he was substituted by Messrs. Duell, Megrath and Warfield, who attended the greater part, if not all, of the taking of the rebuttal proofs on behalf of the complainant; and they argued the above case before Judge Bradford, and on appeal.

No cross-examination.

JOSEPH H. LEVY.

Sworn before me.

JOHN A. SHIELDS,

U. S. Comm'r for N. Y.

Complainant's counsel offers in evidence the issue of the *Street Railway Journal* for November, 1895, so far as relates to the affidavit of the Peckham Motor Truck and Wheel Co. found on pages A, B, C and D thereof, and the same are marked "Complainants' Exhibit, S. R. J., November, 1895, Sheets 1, 2, 3 and 4 respectively."

(The above offer is objected to as incompetent and immaterial, and further that the publication of the said *Street Railway Journal* of November, 1895, has not been proven.)

Adjourned to Thursday, July 27, 1905, at 11 A. M.

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NEW YORK, July 27, 1905.

Met pursuant to adjournment at the same place, at 11 A. M.

Present: Joseph L. Levy, Esq., for Complainants.

Messrs. Warfield & Duell, for Defendant.

Adjourned at the request of complainants to the same place, July 28, 1905, at 11 A. M.

NEW YORK, July 28, 1905.

Met pursuant to adjournment.

Present: Counsel as before.

HAROLD S. BUTTENHEIM, a witness called on behalf of the complainants, having been duly sworn, testifies as follows:

Direct examination.

By Mr. LEVY:

Q. 1. State your age, residence and occupation.

A. My age is 29; residence, Madison, N. J.; occupation, secretary of the *Street Railway Journal*.

Q. 2. State what the *Street Railway Journal* is.

A. It is a technical periodical devoted to the interests of street railways and electric traction.

Q. 3. Where is its office, and where is the paper published?

A. 114 Liberty Street, New York.

Q. 4. How long have you been connected with that paper?

A. Since 1893.

Q. 5. In what capacity?

A. Well, in various capacities. I have occupied various positions, including stenographer, assistant manager of the advertising department and secretary of the company.

Q. 6. Are you familiar with the advertisements published in the *Street Railway Journal*, and the source from which they emanate?

A. I am.

Q. 7. How long have you been so familiar?

A. I should say since the early part of 1895.

Q. 8. Do you know of the Peckham Motor Truck and Wheel Company and the Peckham Manufacturing Company?

A. I do.

Q. 9. Have said companies at different times prepared and sent

to the *Street Railway Journal* for publication in its various advertisements?

(Objected to as irrelevant and immaterial.)

47 A. They have.

Q. 10. And have the said advertisements been published from time to time in the *Street Railway Journal*?

(Same objection.)

A. They have.

Q. 11. I hand you a periodical entitled *Street Railway Journal*, November, 1895. Do you recognize the same? and if you do, state what it is.

A. This is the issue of the *Street Railway Journal* for November, 1895.

Q. 12. Published where?

A. Published in New York?

Q. 13. On what date?

A. November 1, 1895.

Q. 14. I call your attention to pages A, B, C and D, appearing between pages 776 of the reading matter and 45 of the advertising matter of this issue of November, 1895, and ask you to state, if you know, what said pages A, B, C and D are.

(Same objection.)

A. They are the advertisements of the Peckham Motor Truck and Wheel Company.

Q. 15. Were these advertisements on these pages printed and published in and by the *Street Railway Journal* in the issue of November, 1895, at the special instance and request of the Peckham Motor Truck and Wheel Company?

(Same objection.)

A. They were.

Q. 16. I show you the following publications of the *Street Railway Journal*, viz.: January, 1896; October, 1898; January, 1897; May 5, 1900, and May 3, 1902, calling your attention to the sheet inserted opposite advertising page 106 of the issue of January, 1896; to the sheet advertising page 129 of the issue of January, 1897; to the advertising pages 25, 26, 27, 28, 29 and 30, particularly of the issue of October, 1898; to advertising page 138 of the issue of May 5, 1900; and to the advertising page 157 of the issue of May 3, 1902. Were these issues of the *Street Railway Journal* published on the day of their dates in the city of New York? and are the advertisements appearing upon the pages referred to in this question the advertisements of the Peckham Motor Truck and Wheel Company and the Peckham Manufacturing Company, respectively, published at the special instance and request of the Peckham Motor Truck and Car Wheel Company and the Peckham Manufacturing Company?

(Same objection as above.)

A. These are authentic issues of the *Street Railway Journal* published on the day of their dates in the city of New York, N. Y. The advertisements are those of the Peckham Motor Truck and Wheel Co., and the Peckham Manufacturing Co., published at their special instance and request, except that the advertisements in the 48 issues of October, 1898, and May 5, 1900, are in the name of the Peckham Truck Co. I cannot state by which of the Peckham companies this was authorized.

Q. 17. Did you understand that the "Peckham Truck Co." was the same organization as either the Peckham Motor Truck and Wheel Co. or the Peckham Manufacturing Co. at the time these two latter advertisements were published?

(Same objection.)

A. I have no knowledge on the subject, but it is my belief that the advertisements in question were published in the interests of either one or the other of these companies.

(Objected to as testifying to the facts without the witness's knowledge.)

Q. 18. Did you know who was the president of the Peckham Motor Truck and Wheel Co., and the Peckham Manufacturing Co., at the time all of these advertisements about which you have previously testified were published in the *Street Railway Journal*?

(Objected to as irrelevant and immaterial.)

A. I cannot say that I knew at the time of these issues that any one man was president of the company; no.

Q. 19. Did you ever know whether Edgar Peckham was at the time of the publication of any of these advertisements president of either the Peckham Motor Truck and Wheel Company or the Peckham Manufacturing Company?

(Objected to as leading.)

A. I knew that he was president at least some time during that period.

Q. 20. Do you know anything particularly about the getting up and the insertion and publication of the advertisement above referred to appearing in the issues of May 5, 1900, and October, 1898, of the *Street Railway Journal*?

(Objected to as irrelevant and immaterial.)

A. Nothing that I can state positively at this time.

Mr. LEVY: In order to ascertain the defendant's position, defendant's counsel is asked to state on the record whether or not the advertisements above referred to, appearing in the issues of the *Street Railway Journal* of October, 1898, and May 5, 1900, were published therein at the special instance and request of either the Peckham Motor Truck and Wheel Company or the Peckham Manufacturing Company, and whether there ever has been an actual corporation doing business and properly chartered for that purpose, having the

corporate title "Peckham Truck Company" with Edgar Peckham as president, during the period embraced by the said two issues referred to.

(In reply, defendant's counsel states that, not being conversant with the facts, he is unable to inform complainants' counsel as to whether the said advertisements were published at the "special instance and request" of either the Peckham Motor Truck and Wheel Company or the Peckham Manufacturing Company. As to the second query of the complainants' counsel, defendant's counsel states that the proofs relating to the corporate existence of the Peckham Truck Company are within the province of complainants' counsel, and therefore defendant's counsel refuses to state. Testimony relating to these facts is believed to be entirely irrelevant and immaterial to any issues involved in this cause, and objection is taken on these grounds.)

Q. 21. I hand you a publication entitled *Street Railway Journal*, dated October, 1897. Is this an authentic copy of the *Street Railway Journal* published in the city of New York, N. Y., during the month of October, 1897?

A. It is.

Q. 22. I call your attention to page 206 of the advertising pages of this issue and ask you to state, if you know, whose advertisement appears upon that page.

A. The advertisement of the Peckham Motor Truck and Wheel Company.

Q. 23. Was that advertisement published in the *Street Railway Journal* in that issue of October, 1897, at the special instance and request of the Peckham Motor Truck and Wheel Co.?

(Objected to as irrelevant and immaterial.)

A. It was.

Direct examination closed.

No cross-examination.

Deposition closed.

HAROLD S. BUTTENHEIM.

Sworn before me,

JOHN A. SHIELDS,

U. S. Comm'r for N. Y.

Adjourned to Monday, July 31, 1905, at the office of Samuel Bell, Examiner, Post Office building, city of Philadelphia, at 11.15 o'clock A. M.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL Co.

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

UNITED STATES OF AMERICA,

*Southern District of New York, ss:*

I, John A. Shields, United States Commissioner for the Southern District of New York, duly commissioned and qualified and authorized to administer oaths and to take and certify depositions do hereby certify that pursuant to the annexed notice issued and served in the civil cause depending in the Supreme Court of the District of Columbia wherein John A. Brill and J. G. Brill Company are complainants and Washington Railway and Electric Company is defendant, in equity No. 25161, I was attended at the office of Joseph L. Levy, Esq., No. 206 Broadway, New York City, Borough of Manhattan, by Francis Rawle, Esq. of counsel for complainant and by Messrs. Warfield & Duell, of counsel for defendant on the several days and dates hereinbefore said to wit on Wednesday the 26th day of July, 1905, Thursday, July 27th, 1905 and Friday, July 28th, 1905; and that the aforesaid witnesses O. Ellery Edwards, Jr. Charles G. Hensley, Joseph L. Levy and Harold S. Bittenheim who were of sound mind and lawful age were by me first carefully examined and cautioned and sworn to tell the truth the whole truth and nothing but the truth in answering such questions as might be propounded to them by the parties or their counsel and they thereupon testified as above shown and that the depositions by them subscribed and by them set forth were reduced to writing in the presence of the witnesses and from their statements by Mrs. Amanda Tabler, a competent and disinterested typewriter, appointed by me for that purpose by the consent of counsel for the respective parties, and were in my presence read over by the said witnesses and signed by the said witnesses in my presence and were taken at the place in the annexed notice specified and at the time as set forth adjournments being had or taken from day to day as provided for in the said notice and that all was so done, written and signed in the presence of said counsel for said parties.

I further certify that the reasons for taking such depositions was and is and the fact was and is that all of said witnesses live beyond the District of Columbia and more than one hundred miles from the place of trial of the within entitled cause. That I am neither counsel nor attorney for either party to the said cause and am not in anywise interested in the event of said cause. And it being impracticable to deliver said depositions with my own hand to the Court for which they were taken I retained the same for the purpose of being sealed up and endorsed with the title of the cause and by me transmitted to

the Court for which the same were taken, and to remain under my seal until they are opened.

In witness whereof, I have hereunto subscribed my name and affixed my seal, at the city of New York, in the Southern District of New York, this 12th day of August, in the year of our Lord one thousand nine hundred and five, and of the Independence of the United States of America, the one hundred and thirtieth.

[SEAL.]

JOHN A. SHIELDS,  
*United States Commissioner, Southern  
District of New York.*

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*Motion.*

Filed August 16, 1905.

Supreme Court of the District of Columbia.

No. 25161. In Equity.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Complainants,  
vs.

WASHINGTON RAILWAY & ELECTRIC COMPANY, Defendants.

And now comes the defendant, Washington Railway and Electric Company, and moves the court, based upon the record and proceedings herein and the affidavit of H. S. Duell, for an order permitting it to take the depositions of George H. Bowers, Secretary of the Peckham Manufacturing Company, which has assumed the defense of this suit, and George L. Fowler, in surrebuttal of the depositions of complainants' witnesses in rebuttal, William G. Price, Joseph P. Livermore, Walker S. Adams, Louis Pyott, John N. Akarman and Charles F. Uebelacker, and of the charter of the Peckham Manufacturing Company offered in evidence by complainants July 26th, 1905, on page 17 and quoted from on page 18, of the record of interference proceedings between Charles F. Uebelacker and George Martin Brill offered in evidence April 14th, 1905, page 111,—all the foregoing forming a part of the record in the above entitled cause as at present constituted; and for such other and further relief as may appear just in the premises.

Dated this 14th day of August, 1905.

WARFIELD & DUELL,  
*Solicitors and Counsel for Def'ts,*  
220 Broadway, New York.

Messrs. Church & Church and Francis Rawle, Esq., Solicitors and of Counsel for Complainants.

Messrs. Warfield & Duell, Solicitors and Counsel for Defendant.



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*Stipulation Adjourning Motion.*

Filed August 17, 1905.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Complainants,  
vs.  
WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

At the request of complainants, it is hereby stipulated and agreed between the respective solicitors and counsel herein, that the Motion in the above entitled cause set for Friday, August 18th, 1905, may be adjourned to Friday, September 1st, 1905.

CHURCH & CHURCH,  
*Solicitors and Counsel for Compl'ts.*  
WARFIELD & DUELL,  
*Solicitors and Counsel for Def't.*

Messrs. Church & Church, and Francis Rawle, Esq., Solicitors and of Counsel for Complainants.

Warfield & Duell, Solicitors and Counsel for Defendant.

Dated this 16th day of August, 1905.

*Affidavit of H. S. Duell.*

Filed September 15, 1905.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
vs.  
WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

STATE OF NEW YORK,  
*City and County of New York, ss:*

H. S. Duell, being duly sworn, deposes and says:

I am a member of the firm of Warfield & Duell, Solicitors and Counsel for defendant herein.

The defense of this suit has been assumed by the Peckham Manufacturing Company, manufacturers of the trucks complained of.

53 The said company is the successor in business of the Peckham Motor Truck & Wheel Company, having purchased the assets of the latter.

Certain parts of the testimony of complainants' witnesses, William G. Price, Joseph P. Livermore, Walter S. Adams, Louis Pyott and John N. Akarman, forming a part of complainants' rebuttal record herein, have apparently been introduced to try to prove the inoperativeness of certain constructions disclosed in patents which the defendant has introduced in evidence as anticipations of the alleged inventions here in suit, notably Defendant's Exhibits, "Davenport and Bridges 1850 Patent"; "Thyng 1845 Patent"; "Overbagh 1870 Patent"; "Buck 1871 Patent"; "Model Buck Truck"; "Model Thyng Truck"; "Model Overbagh Spring Hanger." No indication was given of such testimony in complainants' *prima facie* case.

The testimony of Charles F. Ubelacker was apparently introduced to persuade the Court that the Peckham Manufacturing Company, manufacturer of the trucks, was a pirate, having really copied the Brill construction in suit; no indication was given in complainants' *prima facie* proofs of any such testimony; and it was introduced by complainants nearly two weeks after their time to take testimony in rebuttal, as limited by the Court, had expired, counsel for defendant having allowed complainants the week during which such testimony was taken voluntarily at the request of their counsel.

The charter of the Peckham Manufacturing Company, offered in evidence by complainants' counsel July 26th, 1905, on what is marked page 17 of the record, which has been certified to the Court for a ruling, but which has been quoted from on the following page, has apparently been produced to show privity between Charles F. Ubelacker, one of the parties to the interference with George Martin Brill, under whose patent the trucks complained of are built, with the Peckham Manufacturing Company through the Peckham Motor Truck and Wheel Company.

Deponent is informed and believes that if defendant is allowed to take the deposition of George L. Fowler, the tendency of the testimony indicated in the seventh paragraph above can be fairly refuted, said George L. Fowler having been a witness in the suit of John A. Brill against the North Jersey Street Railway Company involving the same patents in suit and the same constructions; and deponent is informed and believes that George H. Bowers, who is Secretary of the Peckham Manufacturing Company and was of the Peckham Motor Truck & Wheel Company, can absolutely refute the tendency of the testimony and evidence indicated in the two paragraphs next hereabove. The facts upon which deponent bases his knowledge and information are conversations had with the said George L. Fowler and George H. Bowers, either directly or by members of his firm, and from information given by Jacob R. Beetem, vice-president of the Peckham Manufacturing Company.

54 Inasmuch as this suit may go to the Supreme Court of the United States, whose decision may overrule that of the Circuit Court of Appeals for the Third Circuit in favor of defendant upon the same subject-matter here involved, deponent verily believes that it would be an injustice and tend to do irreparable injury to defendant if the latter is not permitted to introduce the evidence sought so to be.

Deponent verily believes that neither the testimony sought to be introduced by defendant nor the time which may be allowed by the court for such introduction, inasmuch as a hearing cannot be had until the fall term, cannot injure complainants, except in so far as the truth may hurt.

H. S. DUELL.

Subscribed and sworn to before me, this 14th day of August, 1905.

[SEAL.]

ROBERT S. BLAIR,  
Notary Public 251.

*Order Denying Motion for Leave to Take Surrebuttal Testimony.*

Filed September 15, 1905.

In the Supreme Court of the District of Columbia.

No. 25161, Eq. Doc. 56.

JOHN A. BRILL et al.

vs.

WASHINGTON RAILWAY AND ELECTRIC COMPANY.

The motion for leave to take surrebuttal testimony having been argued by counsel for the respective parties, and duly considered by the Court, it is this 15th day of September, 1905, ordered that said motion be, and hereby is denied.

ASHLEY M. GOULD, *Justice.*

55 *Stipulation Fixing Date for Hearing.*

Filed November 18, 1905.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,

vs.

WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

It is hereby stipulated and agreed by and between the solicitors and counsel for the complainant- and defendants herein, at the request of the former, that the hearing of the case, now set by mutual agreement for the 21st inst. before Mr. Justice Stafford, shall, the Court having consented, be heard by Mr. Justice Stafford in the above Court on the 5th and 6th of December, 1905.

FRANCIS RAWLE,

*Solicitor and Counsel for Complainants.*

WARFIELD & DUELL,

*Solicitors and Counsel for Defendant.*

Nov. 17, '05.

*Stipulation of Counsel as to Testimony, &c.*

Filed March 14, 1906.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL &amp; J. G. BRILL Co., Complainants,

vs.

WASHINGTON RAILWAY &amp; ELECTRIC COMPANY, Defendant.

It is hereby stipulated by and between counsel for the respective parties hereto, that the printed records attached hereto, comprising the printed testimony and printed and unprinted Exhibits forming a part of the record as used by both the complainants and the defendant in the above entitled cause at the hearing in this court, be deemed and taken as the official record filed in the cause, in lieu of the original testimony as may not have been filed herein, (excepting such original exhibits as may have been filed in this cause in this Court), and to stand as the record in this Court, and all other courts to which this record may be sent, with the same force and effect as if such testimony and exhibits as are contained therein were actually filed in due course.

CHURCH & CHURCH,  
*Solicitors for Compl'ts.*  
WARFIELD & DUELL,  
*Solicitor- for Def't.*

March 10, 1906.

*Testimony on Behalf of Complainant.*

Filed March 14, 1906.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

OFFICE OF THE CLERK U. S. CIRCUIT COURT,  
POST OFFICE BUILDING, PHILADELPHIA—10.30 A. M.

*Testimony Upon Behalf of the Complainants, Taken Before Samuel Bell, Esq., United States Commissioner, at His Office, Federal Building, Philadelphia, on Thursday, March 30, 1905, at 10.30 A. M.*

Present: Samuel Bell, U. S. Commissioner; Francis Rawle, Esq., for Complainants; Wakefield & Duell, for Respondent.

(Complainants' counsel offers in evidence copies of the Letters Patent in suit, as evidence:

No. 627,898, to G. M. Brill, dated June 27, 1899.

No. 627,900, to G. M. Brill, dated June 27, 1899.

They are marked respectively "Complainants' Exhibit, Complainants' Parent Patent" and "Complainants' Exhibit, Complainants' Divisional Patent.")

Counsel for the respective parties stipulate that Patent Office copies of United States and Foreign Letters Patent shall be received in evidence with the same effect as if duly certified, and that the filing dates appearing thereon be taken to be *prima facie* correct.

Counsel for complainants offers in evidence Assignment from George Martin Brill to John A. Brill dated July 8, 1899, acknowledged the same day, of *inter alia*, Letters Patent of the United States, No. 627,898 and No. 627,900, recorded July 11, 1899, in Liber T, page 302.

Proof of execution is waived.

The paper is marked "Complainants' Exhibit, Assignment."

Complainants' counsel offer in evidence a stipulation between counsel for the respective parties, dated March 24, 1905, with a photograph thereto annexed. This stipulation is placed upon the record and is in the following words:

58 In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

*Stipulation.*

It is hereby stipulated and agreed by and between the solicitors and counsel for the respective parties herein as follows:

I. That the above defendant has since the date of the patents in suit, and prior to the filing of the bill of complaint herein, used and operated in the city of Washington, D. C., a number of electric street railway trucks known as Peckham 14-B-3 trucks under its cars, and that the annexed photograph represents one of such cars with specimens of the said trucks thereunder. The stipulation being made subject to correction if the facts shall hereafter be made to appear otherwise.

II. It is further stipulated that the testimony in this cause, with the exhibits, taken and adduced by either party shall be offered by either party and received in evidence so far as the same may be applicable in two causes now pending in the United States Circuit Court for the Southern District of New York, in both of which the complainants herein are complainants and in one of which the Peckham Motor Truck and Wheel Company is defendant and in the other of which the Peckham Manufacturing Company is defendant, with the same force and effect as if originally taken and introduced therein.

III. In view of the above stipulations, it is agreed that the suit of *Brill et al. vs. The Anacostia & Potomac R. R. Co.*, now pending in the Supreme Court of the District of Columbia, Equity No. 25,162, be dismissed by the complainant therein without costs to either party.

IV. Counsel for complainants herein further agree that as soon as the proofs in this cause are completed he will speed the said two causes pending in the United States Circuit Court for the Southern District of New York to final hearing.

V. It is further stipulated that an order or orders carrying into effect the foregoing stipulations may be entered in any and all of the above mentioned causes by either party without further notice.

CHURCH & CHURCH,  
FRANCIS RAWLE,

*Solicitors and Counsel for Complainants.*

WARFIELD & DUELL,  
*Solicitors and of Counsel for Defendant.*

March 24, 1905.

59 The photograph attached to this stipulation is also offered in evidence, and is marked "Complainants' Exhibit, Photograph of Defendant's Car."

The stipulation is marked "Complainants' Exhibit, Stipulation."

WALTER S. ADAMS, a witness called on behalf of the complainants, having been first duly sworn, testified as follows:

Q. 1. State your residence and occupation.

A. Philadelphia; occupation, chief draughtsman of the J. G. Brill Company, of Philadelphia.

Q. 2. How long have you been in their employ and in what capacity, and particularly for the last ten years?

A. I have been in their employ over twenty years, and in the last ten years have had entire charge of the truck department. Also designed trucks and superintended the working out of detail, and in fact, had full charge of this work and of the drawing room.

Q. 3. To what extent do all orders for trucks come under your observation and charge?

A. After the orders are received all the information in regard to them is sent to the drawing room and the details are there worked out and then sent to the shop. This is all done under my supervision.

Q. 4. To what extent does this stand true since you took charge of the Truck Department?

A. All truck orders that are received receive my personal attention. This has been the case ever since I have had charge of the truck department.

Photographs marked "Complainants' Exhibit, Photograph of Defendant's Car," shown witness.

Q. 5. Please state what you know about this photograph.

A. This photograph was taken in the city of Washington, D. C.,

under my instructions, on January 21, 1905, on the corner of 14th and G Streets.

Q. 6. State whether or not you were present when it was taken by the photographer.

A. I was.

Q. 7. State the words on the large sign on the top of the car, which are somewhat indistinct.

A. "Seeing Washington Car."

Q. 8. State whether or not the trucks under this car are Peckham 14-B-3 Trucks, as known to the trade.

(Question objected to on the ground that the witness has not qualified as to his knowledge of the trucks specified, and further as being indefinite, it not appearing whether the witness is testifying from memory or from the photograph heretofore mentioned. And further, as being accordingly incompetent testimony.)

A. They are.

Q. 9. What familiarity with the trucks put on the market by the Peckham Manufacturing Company, or formerly by the Peckham Motor Truck and Wheel Company and with their various trade designations, have you and have you had?

(Question is objected to as being incompetent and irrelevant, particularly upon the ground that the Peckham Motor Truck and Wheel Company is not a party to this suit.)

A. I am familiar with their make of trucks, having seen them in operation in places, and have seen blue prints and their advertisements with cuts of trucks.

Q. 10. Have you knowledge of the first trucks of the type here in controversy manufactured, sold and shipped from the Brill Works?

A. I have.

Q. 11. State when they were first completed and shipped.

(Question objected to as being incompetent and indefinite, "the trucks here in controversy" not having been shown, explained or otherwise identified.)

A. In the early part of 1896.

Q. 12. State what are the trade names of trucks built by the J. G. Brill Company under the patents in suit, or either of them.

A. 27-B, 27-C, 27-D and 27-G.

Q. 13. From the date of shipment of the first trucks just mentioned by you, how many trucks of those four trade designations have been manufactured and shipped by the J. G. Brill Company up to the present date? Include any such trucks ordered and now in process of construction.

(Question objected to as incompetent, irrelevant and immaterial, and the objection to question 11 is repeated.)

A. Up to and including March 29, 1905, the J. G. Brill Company have sold over 7700 of these trucks, all of which have been manufactured and shipped except a few hundred.

Q. 14: State to what extent you have personal knowledge of all



the various orders for this amount of trucks and of their manufacture at the Brill Works.

A. All these orders have passed through my hands, and I looked after the working out of details and ordering materials, and in many cases inspected the trucks after they were built.

Q. 15. State whether or not, in answering this question as to the number of trucks, you have collated information, in addition to your own personal knowledge, from the original records of the J. G. Brill Company showing sales of trucks and other material.

A. I have.

Q. 16. Please produce such records.

A. I produce the order list showing the order numbers and the names of the railway companies purchasing the same.

Q. 17. As of what dates do these "order lists" begin and end?

(Question is objected to on the ground that the record, order list, etc., have not been properly proved.)

A. From the early part of 1896 to March 28, 1905.

61 Q. 18. Are these order lists in the nature of original records of transactions kept by the Brill Company?

A. Yes, they are.

Q. 19. When, relatively to the receipt of an order, are entries made on them?

A. Practically immediately.

Q. 20. What details are given on them?

A. The order number, the quantity and style of trucks or cars, the railway company for whom they are built, the date the order is received and the approximate delivery.

Q. 21. In what order are the "order numbers" set down on these cards?

A. In numerical order, and also according to the date.

Q. 22. Date of what?

A. Receipt of order.

(Complainant's counsel now places the "order lists" produced by the witness at the disposal of defendant's counsel for his examination and inspection, and to be used by him, if he so desire, in the cross-examination of the witness. He offers to assist defendant's counsel, if desired, in examining these order lists. It is obviously unnecessary to encumber the record with a mass of stiff sheets, several hundred in number, backed with cotton cloth, and together constituting a pile larger than a foolscap sheet and some fifteen inches high.)

(Counsel for defendant agrees with counsel for complainants as to the undesirability of so encumbering the record, but requests that the piles of documents mentioned be marked for identification. Counsel for defendant does not waive his objection as to the irrelevancy, immateriality and incompetency of the documents in question, and of the testimony of the witness relevant thereto, but repeats the same.)

(Counsel for complainants stating that these "order lists" cover consecutive numbering from order 7047 to No. 14,316, it is deemed unnecessary that the Commissioner should further identify them.)

(Counsel for defendant states that, owing to the fact that there are

seven piles of sheets, and of the obvious magnitude of the task of examining them, he requests that they be preserved by counsel for complainants, subject to examination upon reasonable notice.)

(Complainants' counsel states that these order lists are, many of them, in constant use at the works, but that at any succeeding meeting for the purpose of taking testimony in the cause in support of complainants' *prima facie* case, he will again produce these "order lists" for the inspection of defendant's counsel, upon 24 hours' notice, provided such meeting is held in Philadelphia. He will extend this to any subsequent meeting while taking defendant's proofs, if the meeting is held in Philadelphia; in fact, any reasonable examination directly connected with the proof of defendant's case.)

(Counsel for defendant understands that he or any member of his firm may examine the matter in question at any reasonable time in Philadelphia, provided that he or they believe such examination to be desirable in connection with the defendant's position in this case, and upon such understanding agrees to the foregoing.)

Q. 23. In what parts of the United States and to what extent in foreign countries have these trucks been sold?

A. In nearly all cities where they have electric railways in the United States, and in many foreign countries, including England and France.

Q. 24. What do you know about putting patent plates on trucks indicating that the truck is patented and giving the patent dates of the patents in suit?

A. All the trucks had patent plates on them within a reasonable time after the patent was granted.

Q. 25. Which patents?

A. The ones in this suit and others that apply to the trucks.

Cross-examination.

By Mr. DUELL, without waiver of objections:

(Counsel for defendant states that the right of the J. G. Brill Company to be a party to the present suit has not been proven, and accordingly proceeds without waiver of objection thereto.)

X Q. 26. Are you the same Walter S. Adams who testified in the suit of John A. Brill against the North Jersey Street Railway Company in which the bill was filed July 17, 1899, in the United States Circuit Court, District of New Jersey, based upon the two Letters Patent herein involved?

A. I am.

X Q. 27. How long prior to 1899 were you chief draughtsman in the employ of the J. G. Brill Company, Philadelphia?

A. I was not chief draughtsman of the J. G. Brill Company in the year 1899, but had charge of the truck department at that time in the drawing room.

X Q. 28. Have you ever been in the employ of any other company manufacturing car trucks?

A. Yes, in the employ of the Baldwin Locomotive Works previous to going with the J. G. Brill Company.

X Q. 29. In what capacity and for how long?

A. As a pattern maker for about four years; that is, I learned the trade of pattern maker at the Baldwin Locomotive Works.

X Q. 30. Your entire experience then in the construction and working out of details, whether by drawings or otherwise, of electrically propelled trucks has been during your present employment?

A. Yes; I have been with the J. G. Brill Company from the time they started in to manufacture electric trucks.

X Q. 31. When was that?

A. About the year 1888 or 1889.

X Q. 32. Has your experience, as stated in cross-question 30, been amplified by a similar connection in the matter of any sort of trucks?

63 A. Yes; all kinds of trucks manufactured by the J. G. Brill Company, including railroad trucks and trucks of special design.

X Q. 33. Have you or are you to receive extra compensation for your services in this suit?

A. I have not, and do not expect any.

X Q. 34. Did you receive extra compensation, over and above your salary, for your services in the North Jersey suit, above mentioned?

A. I did not.

X Q. 35. Has it been a part of your duty, in your present employment, to work out special designs for trucks, alter the construction thereof, or in other respects employ your own initiative, when requested so to do?

A. My duties cover all of these, and I also consider it my duty to invent without any instructions.

X Q. 36. Would you regard a change of level of the bearing points in a truck to throw the support from the sides to the center, or the reverse, a change of construction?

A. Not necessarily so.

X Q. 37. Please answer yes or no, or state under what circumstances such variation would amount to such a change of construction.

(The question is objected to as not proper cross-examination, and the witness is told that he need not answer it unless he wishes to.)

(Counsel for defendant states that the witness has qualified as an expert and has particularly stated that one of his duties was to make changes in the construction of trucks, when requested, and he is accordingly requested to answer the question.)

(Complainants' counsel points out that while the witness is very expert, he has testified only to facts relating to the photograph in evidence, sales of Brill Trucks and patent plates.)

(Counsel for defendant only wishes the witness to answer from the practical experience which he had testified to having had in the car truck art, and the question is accordingly repeated with the explanation made.)

A. In reference to changing of the level of the bearing points it is only necessary to raise one or lower the other; if done in this way it does not change the construction.

X Q. 38. In your experience with Brill trucks, have you ever had occasion, either personally or by superintendence, to suspend the nose of the motor by a spring link from a supporting bar or frame?

(Same objection.)

A. Yes, we have suspended motors on springs from a supporting bar; that is, we have arranged the trucks for motor suspensions of this form.

X Q. 39. How did you secure the link to the supporting bar?

(Complainant's counsel interposes the same objection, and gives notice that he will ask to have the costs of the cross-examination on these or any other inadmissible lines taxed against the defendant. Also moves that this part of the cross-examination be stricken from the record.)

(Counsel for defendant states that the witness has testified to the manufacture under his supervision of a great many Brill trucks as being here "in controversy," and it is therefore desired to discover some of the characteristics of these or other trucks for the purposes of differentiation and as a general test of the competency of the witness. The defendant does not desire to encumber the record, and the examination of any record which the Brill Company, or those in interest therewith, has compiled in respect to Peckham trucks will substantiate defendant's position.)

A. The link or bolt was secured in different ways, one of which is to have a jaw on the end of the bolt straddling the supporting bar, and a pin running through each. This bolt runs down through the nose of the motor, with a spring above the nose and a spring below the nose of the motor supporting same.

X Q. 40. Did you ever make a connection by passing the bolt through an eye in the supporting bar and securing the bolt thereabove?

(Same objection and same notice.)

A. I do not recollect ever suspending a motor in this manner.

X Q. 41. Do you know of it being done, or if not, would the same be feasible?

(Same objection and same notice.)

A. I do not know from the description just what is meant, or just what method is meant.

X Q. 42. The construction referred to is essentially a bolt or link passing through an aperture in a supporting bar or frame, the specific fastening means being irrelevant.

(Same objection and same notice.)

A. I understand the question to mean supporting the motor from a suspending bar. I do not recall ever seeing a truck that had the

link or bolt running through this supporting bar and suspending the motor therefrom. I would say it was feasible to do so.

X Q. 43. Would such a variation involve a change in the essential construction of a truck? Please state your reasons for your answer.

(Same objection and same notice.)

A. It altogether depends on how the truck is arranged previous to making this change, and I cannot answer the question unless I would know more about how the truck was arranged.

X Q. 44. Take, for example, any one of the types of the Brill trucks, to which you have referred.

(Same objection and same notice.)

A. If it was a truck with a suspension like I have referred to, which the Brill Company has built, it would require a change in the construction of the suspension bolt and the suspending bar. The bolt would have to have a head or nut on in place of a jaw, and the suspending bar would have to have a hole vertically in place of a horizontal one.

X Q. 45. Would or would not the changes mentioned be mechanical equivalents?

(Same objection and same notice.)

A. I would say they would.

Recess until 3 o'clock.

65 X Q. 46. In answer to Q. 13 you stated that the J. G. Brill Company sold over 7700 of trucks designated as 27-B, 27-C, 27-D and 27-G trucks since the early part of 1896. Do you base this statement upon the data which you testified to in answer to Q. 18, as being "in the nature of original records of transactions kept by the Brill Company"?

A. I base this on personal knowledge, which is confirmed by the above referred to original records.

X Q. 47. Are those records the ones upon which orders are placed as soon as they reasonably can be, upon receipt thereof, and can you testify of your own knowledge that they are primary and original, as intimated?

A. These records are original and the orders are placed on them within a reasonable time after received.

X Q. 48. How do you know this, if you are chief draughtsman and superintendent of the truck department, and attend strictly to your duties as such?

A. When these orders are received all the correspondence is sent to me and I know from observing the dates of the orders received from the Railway Company, and the dates when they are entered on our order list, and in fact I have all the knowledge it is possible to obtain in connection with these orders. It is necessary to have this information in order to work out the details.

X Q. 49. Who transcribes the original orders as received to the list you have testified to as being original?

A. A clerk employed by J. G. Brill Company who enters the orders

on the order list, also makes out a contract folder embodying all the correspondence.

X Q. 50. If a clerk does this, and you do not compare the original orders with the secondary order list in every case, how can you testify of your own knowledge the correctness thereof?

A. It is practically impossible for the number of trucks ordered in the shop to differ from the order list, as the trucks are built according to the information sent from the drawing room to the shop, and they are shipped according to the destination given on the order list, and if they did not agree it would be because a mistake had been made in ordering either too few trucks or too many trucks to be made in the shop. This is of such an unusual occurrence that I do not recall at this time any such discrepancy, although it is possible it has occurred in the past. I would certainly have knowledge of this if it were to happen, and could, if necessary, refresh my memory by looking over the records to see if there were actual cases of this kind.

X Q. 51. Where is this order list kept?

A. In the office of the J. G. Brill Company.

X Q. 52. How do you know that 27-B, 27-C, 27-D and 27-G trucks, and all of them, have been built under the patents in suit?

A. I know the details of these trucks and I know generally the patents in suit, and while I am not a patent expert, it is my opinion that the patents cover these trucks.

66 X Q. 53. Can you testify of your own knowledge that each of these trucks precisely embody the disclosures of both the patents in suit?

A. I believe they do.

X Q. 54. Of positive knowledge?

A. I stated before that it was my opinion that these trucks embodied the claims of the patent in suit.

X Q. 55. Who took the photograph marked "Complainants' Exhibit, Photograph of Defendant's Car"?

A. A man by the name of W. M. Sifton, who is employed by the C. M. Bell Photograph Company, Washington, D. C.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 56. Of how many truck sales of this type could you testify of your own knowledge without any examination of the Brill records?

A. I have used the Brill records to refresh my memory, as practically all these orders I have personal knowledge of by seeing the correspondence and the order. Of my own knowledge, I know the Brill Company have manufactured, without referring to any books, about three or four thousand.

R. D. Q. 57. In stating that the trucks sold embodied the two patents in suit, that is, both the parent patent and the divisional patent, had you in mind any other divisional patent of the same date?

A. There is another divisional patent of the same date, and the

trucks sold embody some of these patents, but not all the trucks embody all the patents.

R. D. Q. 58. What about the parent patent?

A. I believe all the trucks sold are covered by the parent patent.

Recross-examination.

By Mr. DUELL:

R. X Q. 59. Can you testify of your own knowledge that every one of the 7700 trucks which you have mentioned as being sold, precisely embody the disclosures of the parent patent?

A. I did not see every one of these trucks, but as far as it is possible to have knowledge without seeing the truck, I answer yes.

R. X Q. 60. Please answer the same question as applied to the divisional patent in suit.

A. My answer is no; they do not all embody the divisional patent.

R. X Q. 61. Do you know how many of them do?

A. No, I do not.

R. X Q. 62. Do you know how many embody both the patents in suit?

A. No, I do not.

67 By Mr. RAWLE:

R. D. Q. 63. Give your opinion as to whether the trucks indicated by 27 with B, C, D and G added, embodied the subject matter of the parent patent.

(Question is objected to as being manifestly incompetent and irrelevant, and as calling for matter of opinion, or hearsay, or both.)

A. My opinion is they do.

Adjourned to meet Friday, March 31, 1905, at 10.20 o'clock A. M.

POST OFFICE BUILDING, PHILADELPHIA,  
March 31, 1905—10.30 a. m.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., U. S. Commissioner; Francis Rawle, Esq., for Complainants; Warfield & Duell, for Respondent.

WARREN SMITH, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

By Mr. RAWLE:

Q. 1. State your residence and occupation.

A. Residence, Prospect Park, Delaware County, Penna. Occupation, draughtsman, in the employ of the J. G. Brill Company.

Q. 2. How long have you been in that employ and in what part of the business, and in what position?

A. I have been employed by them since October of the year 1889 in the capacity of draughtsman, especially in connection with the work pertaining to cars, but also largely in connection with truck



work. I am at present the assistant chief draughtsman and have charge of their car department.

Q. 3. Under whom?

A. Under Mr. Walter S. Adams, who is the chief draughtsman and has charge more extensively of the truck work.

Q. 4. Have you recently, under my instructions, visited Washington, D. C., and inspected a Peckham truck or trucks, and if so, when?

A. I went to Washington on March 3d and 9th of the present year, 1905, and inspected Peckham trucks.

("Complainants' Exhibit, Photograph of Defendant's Car," shown witness.)

Q. 5. State whether or not this is the car which you then inspected.

A. It is.

Q. 6. Where did you see it?

A. On the line of the Washington Railway and Electric Company at the terminus of their road on G Street between 14th and 15th Streets.

Q. 7. State what you did.

68 A. I had with me a blue print of a Peckham truck of a like character to those used under the car above mentioned, and I compared the trucks under that car with the one shown on the blue print, making notations and corrections on the aforesaid blue print wherever the trucks differed from the one shown, so that I might be enabled to make a drawing correctly representing the trucks.

(Answer is objected to as being incompetent and irrelevant; and further, on the ground that the witness is not qualified as to his knowledge with respect to Peckham trucks, and motion is made to strike the answer from the record.)

Furthermore, the production of the blue print will be called for on cross-examination.

The WITNESS: I then returned to my place of business and engaged another man on a tracing which represented the trucks which I had examined.

Q. 8. You have mentioned two visits to Washington. What relation to the matter did the second visit bear?

A. The second visit supplemented the first visit, as I was unable to make a complete examination of the truck upon the occasion of my first visit.

Q. 9. Whom did you engage to make that tracing?

A. A young man by the name of Josten, whose initials I cannot recall, but who is in the employ of the J. G. Brill Company, and has been for some time past.

Q. 10. In what capacity?

A. In that of a draughtsman.

Q. 11. State whether or not this tracing was made under your direct personal supervision and instruction.

A. It was.

Q. 12. Please produce the tracing.

A. I produce it.

Q. 13. State whether or not this drawing which you call the tracing, which is made on tracing paper, correctly and accurately represents and portrays the trucks which you saw in Washington, as you have testified.

A. It does.

Q. 14. State whether or not you observed on those trucks any designation of the maker's name or any trade name or number.

A. The monogram of the Peckham Truck Company was cast on the box lids and the name plate of the same company was attached to the frame of the truck. I do not recall the precise wording, but I observed it was there, however.

Q. 15. Did the plate contain the name Peckham?

A. It did.

Q. 16. Was there any trade designation by number or letter on the trucks?

A. I cannot state positively what was on the plate, but I did observe it closely enough to identify the truck.

Q. 17. Identify it as what?

69 A. As being what is termed a Peckham truck.

Q. 18. To what extent, if any, have you been familiar with the Peckham make of trucks, so as to recognize one when you see it?

A. I have personally made sketches, drawings and tracings of at least four other Peckham trucks that I can recall, and have therefore become familiar, to some extent, with the construction of these trucks; also with the marks that are peculiar to the trucks manufactured by the Peckham Company.

Q. 19. Do you know the trade designation of the trucks you saw?

A. I believe they are what are termed the Peckham 14-B-3.

Q. 20. Did you observe any peculiarity about the signs on the car which you have been testifying about?

A. I did, there being a large sign at each side of the upper roof with the lettering thereon "Seeing Washington."

Q. 21. As your expert qualifications have been objected to, I will ask you to state where you were educated and where you learned your business as a mechanical draughtsman.

(Counsel for defendant states that the objection noted was not to the general qualifications of the witness as to draughting, but applied solely to his knowledge of Peckham trucks, so-called. He makes this statement as it is his earnest desire not to cumber the record in any manner.)

(Question withdrawn.)

(The tracing or drawing produced by the witness is offered in evidence and marked "Complainants' Exhibit, Drawing of Defendant's Truck.")

(Defendant's counsel objects to the reception in evidence of the tracing mentioned on the ground that same is secondary evidence, and motion is made to strike the same from the record, together with all the testimony relevant thereto. The original blue print, having the notations of variations between the truck which it originally purported to represent from the truck here in question, is called for.)

Q. 22. Will you please produce the blue print drawing which you had with you in Washington when you inspected the defendant's trucks?

A. I produce it.

Q. 23. What is this blue print drawing?

A. This is a representation of a Peckham truck in use on the line of the North Jersey Street Railway Company in the year 1900, and was made from a tracing which, in turn, was made from a drawing, which in its turn was made from sketches taken from the actual truck above mentioned. This was accomplished by myself personally.

(Answer is objected to as being manifestly incompetent, and motion is made to strike the same from the record. It is suggested that instead of playing the game of "The House that Jack Built," the originals be produced.)

Q. 24. For what purpose was the tracing of this blue print made, and where was it used for a duplicate blue print?

A. The tracing was made for the purpose of filing as an exhibit in previous case of litigation upon which I was examined.

70 Q. 25. Against what company?

A. I cannot state positively that it was against the North Jersey Street Railway Company, but I believe that to be the case, and that it was their truck that I was sent to examine at what is known as their Plank Road Barn near Hoboken. There has been some time elapsed since I visited there, and I cannot recall at present the exact location.

Q. 26. State whether or not this last blue print you have produced represents a Peckham 14-B-3 truck.

A. It does.

(Complainants' counsel places this last blue print at the disposal of defendant's counsel for his inspection and cross-examination, if desired, not deeming it necessary to offer it in evidence at present as unnecessarily increasing the record.)

(Defendant's counsel requests that the blue print referred to be marked for identification.)

(The U. S. Commissioner marks the same for identification as follows: "*John A. Brill et al. vs. Washington Railway and Electric Company*, Supreme Court of D. of C. 230.05, Samuel Bell, U. S. Commissioner, for Identification.")

(Defendant's counsel consents to the substitution in evidence of a blue print copy of the tracing in evidence, marked "Complainants' Exhibit Drawing of Defendant's Truck," the same to be without waiver of objections relevant thereto and upon the understanding that the original tracing will be subject to defendant's call.)

Cross-examination.

By Mr. DUELL, without waiver of objection:

X Q. 27. Are you the same Warren M. Smith who testified in the suit of *John A. Brill vs. North Jersey Street Railway Company*?

A. I am.

X Q. 28. You have testified to the examination of certain trucks in Washington, and to the fact of the tracing which was offered in evidence correctly representing the same. Was this tracing drawn to scale in every particular?

A. It was drawn to a scale of about three inches to the foot or one-quarter size, with possibly one or two exceptions of that portion of the truck which came directly under the center of the car body and which I could not get sufficiently close to to apply a rule thereto, that portion of the truck which was accessible from the side is drawn correctly to the above mentioned scale.

X Q. 29. You are not then able to testify of your own knowledge that the said tracing correctly represents the entire truck, are you?

A. The tracing mentioned does correctly represent diagrammatically the above truck.

X Q. 30. If you were shown that it does not correctly represent the entire truck, you would probably wish to amend your previous answer and possibly doubt, to some extent, the correctness of your knowledge with reference to such truck, would you not?

A. The question being purely hypothetical. I would wish to be shown first wherein the blue print differs before stating unreservedly or reservedly that my knowledge of the above truck is faulty or not faulty in response to your question.

X Q. 31. Is the breaking mechanism shown?

A. The breaking mechanism is not shown, and your question shows me at once the folly of my stating that I was not familiar with the construction of that truck before learning wherein the blue print differed from the truck. The blue print is not complete in that particular, as the matter of brakes was an unessential part of the truck so far as the case in question was concerned. The omission of the brakes from the blue print was intentional and not an oversight, as the drawing would have been much more complicated without any benefit being derived one way or the other.

X Q. 32. What do you know about what is or is not essential to "the case in question"?

A. My instructions were, on going to Washington, to see wherein the trucks in operation upon the railway previously mentioned differed from the truck shown on the blue print used in the North Jersey case, and as I had not been instructed to add the brake rigging thereto, which had been omitted in the case of the blue print used in the North Jersey case, I did not do so, consequently I deemed the brake rigging as an unessential factor in this instance.

X Q. 33. How long a wheel base did the truck have which you have testified the blue print marked for identification and upon which the figures 4-6 in red crayon appear between the lower part of the wheels correctly represents?

A. The wheel base was four feet on the North Jersey trucks, which were the trucks represented by the blue print marked for identification.

X Q. 34. Then what do the numbers 4-6 on this blue print mean?

A. This dimension 4'-6" indicates the wheel base of the trucks in

Washington previously referred to, and is one of the corrections referred to in my previous testimony.

X Q. 35. Are the spiral springs which are used in connection with the two links shown in the tracing heretofore mentioned drawn to scale?

A. They are.

X Q. 36. How did you get at the number of spirals or coils?

A. I did not count the number of coils; I took the diameter of the steel and the height of the spring.

X Q. 37. Then you cannot testify of your own knowledge that the tracing correctly represents the truck testified to as having been examined in Washington?

A. In so far as having the correct number of coils shown, I cannot testify; neither can I testify that the radii of some of the curves shown on this tracing, which may be shown as three inches, is not

72 on the actual truck  $3\frac{1}{2}$  inches, nor that the thickness of material which may be shown on this tracing as  $\frac{5}{8}$  is not on the truck  $11-16$  of an inch. So far as the actual construction of the truck is concerned, the tracing correctly represents this.

X Q. 38. You mean the general construction, do you not, with certain specific variations such as you have testified to as being uncertain.

A. I do, with any other variations of a like nature, such as the use of square head bolts where hexagon heads are indicated, the thickness of material which has been mentioned before, and possibly the number of leaves in the semi-elliptic spring, etc.

X Q. 39. The resiliency or spring strength of a spiral spring depends, does it not, upon the thickness of the metal, the number of coils, together with their sheer or slope from the level and the length of the spring?

A. It does.

X Q. 40. Can you testify as to the relation in the specific particulars mentioned, between the spiral springs used in connection with the links and those used in connection with the journal boxes, as shown in the tracing mentioned?

A. I cannot, but I would say that the box spring, is the larger one of the two, so far as its diameter is concerned.

X Q. 41. It would then be the stronger of the two, would it not? but how much stronger you cannot say, can you?

A. It would not necessarily be the stronger, but I cannot say how much stronger.

X Q. 42. You have testified to examining trucks upon two visits to Washington. Did you compare the old blue print from which you made the subsequent tracing with the same truck, on both visits?

A. To the best of my knowledge, it was the same truck.

X Q. 43. You mean you think it was, do you not? or if you know positively, then how?

A. It was quite evident that I think that it was, if I have testified that to the best of my knowledge it was. I cannot state positively that it was the same truck, as I did not stay alongside of it from March 3d to March 9th, but it was the truck under the same end of the same car that I had examined upon my first visit.

X Q. 44. How do you know it was the same car?

A. The number on the car, which was 500, would indicate this.

X Q. 45. Do you know whether this truck was made by the Peckham Manufacturing Company, or the Peckham Motor Truck and Wheel Company, or either of them?

A. I do not know by whom the trucks were made, as I did not see them in the course of construction, but, as has already been testified, they bore the name plate with the name "Peckham" thereon, and the box lids mere marked with the regular monogram used by the Peckham Company which has been on other trucks that I have examined in previous cases.

X Q. 46. What Peckham Company?

A. The Peckham Truck Company.

73 X Q. 47. Do you mean the Peckham Motor Truck and Wheel Company?

A. I cannot state positively the corporation name that was shown on the name plate, but I do know the name "Peckham" appeared thereon.

X Q. 48. Referring to "Complainants' Exhibit, Drawing of Defendant's Truck, which has been testified to as representing one of the trucks used under car 500, I hand you "Complainants' Exhibit, Photograph Defendant's Car," on which is the number "500," and ask you whether or not the photograph shows a leaf spring under the side bar of the nearer truck, which is practically parallel with said bar, and whether or not the leaf spring shown in the other exhibit, to which I have drawn your attention, is not curved very perceptibly upward?

A. The leaf spring referred to, and which is shown on the photograph, represents the leaf spring with the weight of the car body thereon; the leaf spring shown on the tracing shows it in a released position with an upward arch in the center which will be present if the trucks were without any extraneous load. The bottom of the leaf spring shown in the photograph is very nearly parallel with the bottom of the side bar.

X Q. 49. Then the "Complainants' Exhibit, Drawing of Defendant's Truck" does not in still another particular correctly represent the truck as used under the same Washington car?

A. The spring is shown arched on the bottom, unlike the spring under the Washington car, for the reasons stated above, which shape the springs at present under the car would very nearly assume if the weight of the car body was taken therefrom.

X Q. 50. How do you know that these series of metal leaves are not intended and do not actually maintain practically the position, as shown in the photograph, that is, with their under side practically parallel with the side frame thereabove? This, in view of the fact that you have testified that you did not know either the number or thickness of the leaves of which these so-called springs are composed.

A. If these springs maintain the same position with the weight of the car body removed, then they would still maintain the same position if an extraneous load, equal to the weight of the car body, was superimposed; that being the case, a spring at this point would be valueless, as a solid bar would accomplish the same purpose. It is

this spring very largely that contributes to the easy riding qualities in a truck of this construction, consequently it is subject to considerable variations in height by compression, when in use.

(The answer of the witness is objected to, as being irresponsible, and further upon — that he has not qualified as an expert in the above matter, and a motion is made to strike the same from the record. The witness is again requested to answer the above question, telling what he actually knows with reference to the matter asked for in relation to these particular trucks which he saw, and not to state what he infers or presumes.)

X Q. 51. Question repeated.

A. I cannot state positively that the spring would assume the form of an arch, as shown on the tracing, as I did not release  
74 the spring from its load. The question involved is purely a mechanical one, which can be accepted as true, because of past demonstrations brought to my attention in other trucks of the same construction in this particular.

Recess until 3 o'clock.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 52. State whether or not the old blue print produced by you was made from the actual tracing which was an exhibit in the case of *Brill vs. The North Jersey Street Railway Company* in U. S. C. C. for the District of New Jersey, in which you testified.

A. It was made from the same tracing.

R. D. Q. 53. State whether or not the tracing produced by you today correctly represents the trucks under the car you saw in Washington, whether they were the same set of trucks at both the visits or not?

A. It does correctly represent the trucks with a few minor exceptions that I have already noted in my testimony.

R. D. Q. 54. State whether or not you took to Washington on March 3d a duplicate photograph of the photograph which is here before you marked "Complainant's Exhibit Photograph of Defendant's Car."

A. I did.

Recross-examination.

By Mr. DUELL, without waiver of objections:

R. X Q. 55. Referring to the old blue print which you have testified to as having been made from an actual tracing, which was an exhibit in the case of *Brill vs. The North Jersey Street Railway Company*, how long a wheel base is shown?

A. As previously testified, this is four feet.

R. X Q. 56. Referring to "Complainants' Exhibit Drawing of Defendant's Truck," which you have testified to as more or less correctly representing the Washington trucks involved, how long a wheel base does this show?



A. Four feet six inches.

The following testimony of Samuel T. Bole and James Rawle was by consent interposed and taken on March 30th. It is placed here for convenience.

SAMUEL T. BOLE, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

Examined by Mr. RAWLE:

Q. 1. State how long you have been employed by the J. G. Brill Company and what your position in the works has been since 1896.

A. I have been in the employ of the J. G. Brill Company for the past 19 years; have been general foreman of the machinists and truck department, having the supervision of the machining of all parts and the assembling of all trucks.

75 Q. 2. For how many years have you had such supervision?

A. For the past 16 years.

Q. 3. State what your practice has been with regard to putting patent plates on 27-G trucks, and other trucks of that type, since the date of issue of Letters Patent in suit, June 27, 1899.

A. Our practice has been to apply the patent plate the same as any other part of the truck necessary for the completion of the same. These patent plates bear an individual casting number and are shown on our shop card furnished the department containing the necessary parts of the truck and for a guidance in the assembling of the truck.

Q. 4. How general has this practice been?

A. It is carried out in all orders pertaining to trucks.

Q. 5. My question is as to how general this practice has always been, that is, whether you are now referring to any particular period or the entire period mentioned by me.

A. I am referring to the entire period mentioned by you, or, as I understand your question, from 1896.

Q. 6. Please produce a patent plate or patent plates, such as you have testified to.

A. I produce patent plate "No. 4793," and also patent plate "No. 6419."

Q. 7. When were these respective plates used, that is, which first?

A. No. 4793 was the first plate used, commencing some time in 1899. No. 6419 has been used ever since—shortly after that time.

Q. 8. What are these numbers which you have pointed out on these patent plates?

A. They are the pattern numbers.

(The patent plates produced by the witness are offered in evidence. By agreement of counsel the letters and figures on them are taken down in the record to be used with the same effect at the hearing as the plates themselves could be.)

The plate marked 4793 contains the following:

"J. G. Brill Company's  
No. 27 Truck  
3 Patents June 27 1899."

The plate marked 6419 contains the following:

"J. G. Brill Company's  
No. 27 Truck  
Patented  
June 27 1899    Oct. 17 1899    Feb. 6 1900  
June 27 1899    Nov. 21 1899    Aug. 28 1900  
Order No. —"

Q. 9. I observe on the second line after the figures "27" a blank space. What was this used for?

A. The blank space in the patent plate referred to was used for the purpose of stamping the letter indicating the type of truck.

76 Cross-examination.

By Mr. DUELL:

X Q. 10. Were these two patent plates referred to ever secured to any Brill truck or trucks? I mean these plates you have produced.

A. No.

X Q. 11. Do you know of your own knowledge that every 27-B, 27-C, 27-D and 27-G truck put out by the Brill Company since the date of the patents in suit bore a plate which was a facsimile of either of the two plates produced?

A. I cannot say that I have personally seen a patent plate of this kind applied to every individual truck, but they are applied, for the reason that the truck would not be complete without them.

X Q. 12. Your answer then is based upon inference and not upon personal knowledge?

(Objected to because the witness has testified to his very complete personal knowledge of the trucks that have been manufactured in his department during the period mentioned.)

A. My answer is based upon the method we employ in assembling trucks and the inspection of trucks after completion.

X Q. 13. Is it a part of your duty to inspect all completed trucks of the character specified?

A. It is.

X Q. 14. Then why don't you know of your own personal knowledge whether or not a facsimile of one of the two plates produced has been secured to all trucks since the dates of the patents in suit?

A. For the reason that there have been short intervals when I would be called away from the department or possibly away from the works. In this case I have an assistant whose duty it is to inspect these trucks, and all trucks for me.

X Q. 15. Can you testify of your own knowledge that a facsimile

of one of the plates produced has been secured to every truck of the type specified which you have inspected?

A. I can.

X Q. 16. But not to all?

A. All that I have inspected.

X Q. 17. Do you know how many you have inspected?

A. It would be impossible for me to state the number.

X Q. 18. Are these two plates facsimiles in every respect of those you have testified to as having been secured to No. 27 trucks?

A. They are, with the exception of not being machined ready to apply.

X Q. 19. To what part of a truck is a patent plate applied?

A. To the outer side of the side frame.

X Q. 20. When was the 27-B, 27-C, 27-D or 27-G truck first put out by the Brill Company?

(Objected to as not proper for cross-examination.)

A. I have no records with me, but to the best of my recollection about 1896.

77 (Counsel for defendant objects to and moves to strike out all testimony relative to the two patent plates here produced on the ground that the originals or an original are the best evidence that could be produced.)

Redirect examination.

By Mr. RAWLE:

R. D. Q. 21. State whether or not you ever saw one of such trucks shipped from the works without a patent plate.

(The question is objected to as manifestly incompetent and irrelevant to any issue in this case.)

A. I did not.

R. D. Q. 22. State whether or not such a truck, without a patent plate on it, would have been considered as a completed truck and would have passed your inspection.

(Same objection.)

A. It would not.

JAMES RAWLE, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

Q. 1. What position do you hold in the J. G. Brill Company, and how long have you held it?

A. Treasurer, Secretary and a Director, since the formation of the company in 1887.

Q. 2. What position has Mr. John A. Brill held during that time?

A. Vice President and Director.

Q. 3. State whether or not since the date of the patents in suit, which is June 27, 1899, and the assignment of them to Mr. John A. Brill on July 8, 1899, there has been any contract or arrangement

between Mr. John A. Brill and the company as to the right to work under these patents.

A. There has been such an arrangement, which has existed continuously from the time of the said assignment for J. G. Brill Company to manufacture exclusively under these patents.

Q. 4. For what territory in the United States?

A. The entire United States.

Cross-examination.

By Mr. DUELL:

X Q. 5. Has the J. G. Brill Company been accorded any rights by Mr. John A. Brill to manufacture trucks made under the patents in suit for use abroad?

A. Yes.

X Q. 6. What rights, and dating from when?

(Objected to because if the exclusive right to manufacture under these patents in the entire United States belongs to the company, it is immaterial where the trucks are used out of the country.)

78 A. General rights for everywhere in the world, dating from the acquisition of the patents in suit by Mr. John A. Brill.

X Q. 7. Do you mean exclusive rights to manufacture, such as you have testified to in answering question 2?

A. Yes; there was never any right granted to anyone, excepting the Brill Company, to the best of my knowledge, excepting in the case of a little Canadian Company a number of years ago, the precise date of which I cannot testify to now, as I cannot recall it, and this company turned out to be a set of scoundrels and cheats, so that I may say, generally speaking, the J. G. Brill Company has been the sole licensee.

X Q. 8. Then you cannot testify, in view of your previous answer, that the J. G. Brill Company has been since the date of the patents in suit and during that entire period affirmatively accorded the exclusive rights to manufacture under the two patents in suit?

(Objected to as misrepresenting the witness's testimony. The Canadian transaction which he has referred to cannot possibly have anything to do with the United States Letters Patent in suit.)

A. I am not sure that I was not laboring under a mistake in giving that answer to the previous question in so far as it might lead one to infer that this license to certain small Canadian manufacturers was given by virtue of or under ownership of U. S. Letters Patent, as this would have been an absurdity.

X Q. 9. Are you aware that in 1899, July 17th, John A. Brill brought suit against the North Jersey Street Railway Company based upon these same two letters patent?

A. I am under the impression that he brought such suit, although I am not sufficiently familiar with the subject to remember the numbers of the letters patent nor their dates nor the date of any such suit as you refer to.

X Q. 10. As treasurer of the J. G. Brill Company, have you had knowledge of all or some of the bills paid in connection with patent litigation?

(Objected to as not proper for cross-examination.)

A. Yes.

X Q. 11. Do you recollect then the name of a suit entitled *John A. Brill vs. The North Jersey Street Railway Company*?

A. Yes.

X Q. 12. Did you know that such a suit was being brought at the time the same occurred?

(Same objection.)

A. Yes.

X Q. 13. And you knew that the J. G. Brill Company had an exclusive license to manufacture under the two patents here in suit?

A. Certainly, I did.

X Q. 14. Did you take part in any controversy relevant to such proposed suit?

A. Occasionally I did; not always.

79 X Q. 15. Are you a relative or connection of Mr. John A. Brill's, and if so, what?

A. No.

X Q. 16. Will you please state why the J. G. Brill Company did not join in the North Jersey suit?

A. I had not recollected that they did not join, but if they did not, as you state, I cannot assign any reason for their not having done so. The work of the officials of the J. G. Brill Company is divided up among the several individuals and usually, unless one of them has felt the need of the assistance of the other, he has carried out his own part and subsequently reported his action to the others, consequently there are a good many details that I have not charged my mind with.

X Q. 17. I presume that all suits, as well as the North Jersey suit, are brought under advice of counsel, are they not?

A. Usually our counsel is advised to bring the suit, and we have been surrounded by such a nest of pirates that we have kept him busy.

X Q. 18. Do the officials of your company decide what suits shall be brought and who the parties thereto shall be, and was this so done with reference to the North Jersey suit?

A. The officials of the J. G. Brill Company, other than Mr. John A. Brill, have a general cognizance of such matters, but the far larger part of the decision to bring any suit, the defendants against whom it shall be brought, which I suppose is your meaning in the question as to the parties thereto, has in all cases been left to Mr. John A. Brill in active consultation with Francis Rawle, Esq., our counsel.

X Q. 19. Will you state whether this was the case in the matter of the North Jersey suit?

A. Unquestionably it was, in the line of what I have stated in the last answer.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 20. I observe that in one of your earlier answers you referred to the license to the Brill Company "to manufacture exclusively under these patents"; what about the right to vend or to sell and the right to use?

A. If that was all the language I used in that answer, I beg to amend by saying that it was incomplete. The right to the J. G. Brill Company under these letters patent is to manufacture, vend, sell and use the articles covered by these letters patent.

Adjourned to meet Monday, April 3, 1905, at 10.30 A. M., at this office.

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OFFICE OF CLERK OF U. S. CIRCUIT COURT,  
POST OFFICE BUILDING,  
PHILADELPHIA, April 3, 1905—10.30 a. m.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., U. S. Commissioner; Francis Rawle, Esq., for Complainants; Joseph P. Livermore, the witness.

The above were present at 10.30 A. M. At 11.35 Mr. Duell called complainants' counsel on the long distance telephone, from New York, and informed him that he could not be present until 3.30 P. M.

JOSEPH P. LIVERMORE, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

Direct examination.

By Mr. RAWLE:

Q. 1. What is your name, age, residence and occupation?

A. Joseph P. Livermore; age, 50; I live in Cambridge, Mass.; solicitor of patents and mechanical expert, having my office in Boston, Mass.

Q. 2. Please say what experience you have had in matters relating to mechanics and letters patent?

A. I studied mechanics and draughting at the Lawrence Scientific School at Harvard University, at which school I was graduated as civil engineer in 1877, having previously been graduated at Harvard College in 1875.

I have been practicing as solicitor of patents since 1879, and have constantly been occupied in examining machinery and apparatus of various kinds, and descriptions and drawings thereof, for the purpose of analyzing and explaining the substantial features of construction and mode of operation of the contrivances therein embodied or represented. During the past 15 years or more much of my time has been employed in the examination of letters patent for the purpose of advising with reference to the nature and scope of the inventions therein set forth, and I have testified as an expert witness in a large number of cases.

Q. 3. Have you read and do you understand U. S. Letters Patent to George Martin Brill, No. 627,898 and No. 627,900, here in suit?

A. Yes.

Q. 4. Please state what you understand to be the construction therein described.

A. The said patents show and describe trucks especially intended for street cars or other cars where the trucks are "designed for carrying a motor for electric propulsion and the like." The said  
81 trucks are of the kind commonly known as pivotal trucks, there being one four-wheel truck near each end of the car body, connected with the car body by a vertical pivotal connection, so that the trucks may turn in the horizontal plane in relation to the car body as is necessary in traveling around curves in the track.

Taking up first the patent No. 627,898, which I will call the first Brill patent, the main objects to be attained by the construction therein shown are to provide an efficient support for the car body in as low a position as is practicable, and to afford an efficient but yielding and elastic connection between the car body and the axle boxes for the journals of the wheels which ultimately support the weight of the car and its load, the connections through the truck structure from the car body to the wheels being such as to prevent the shocks encountered by the wheels from being transmitted to the car body which is thus rendered easy riding and comfortable for the passengers. The structure is such, however, as to afford an efficient draft union or connection from the wheels, to which the propelling force of the motor is applied, to the car body, which is to be propelled along the track. The construction is also such that the flexibility and elasticity in the internal connections in the truck structure also tend to relieve the car body from shocks arising from the application of the motive power to the wheels and of the restraining power of the brakes in starting and stopping the car.

The truck forming the subject of the first Brill patent, in which the attainment of the above named object is sufficiently provided for by comparatively simple means, is made up of three principal components, namely, first, the truck frame which controls the position of the axle boxes, and is supported upon the axle boxes, through the intervention of springs over each axle box, which I will call the axle box springs. The second principal component is the bolster, which is a strong rigid transverse beam, pivotally connected at the middle of its length with the car body, which rests directly upon it; while the third principal component comprises the parts which afford the yielding and elastic connection between the first and second components, namely the truck frame and bolster, such that an adequate connection is afforded between the two to sustain the bolster and car body on the truck frame and wheels while absorbing and preventing the transmission of shock from the latter to the former.

Referring now to the construction more in detail of each of said principal components, and taking up first the truck frame, said frame is in the general form of a rectangular frame surrounding the two pairs of wheels, and having two side frames outside of the wheel



gauge, one at each side of the truck. Each side frame consists essentially of a longitudinal beam at some height above the wheel journals, having near each end yokes or axle box pedestals, each in the form of an inverted U, with the axle box embraced between the vertical sides of the pedestal, and capable of moving vertically therein, but having no appreciable movement relative to the axle boxes in horizontal direction. An axle box spring is interposed between the top of each axle box and the crown of the corresponding pedestal to sustain the truck frame upon the axle box

82 while permitting a yielding or spring cushioned vertical movement of one relatively to the other. The side frames are extended beyond the axle boxes about at the level thereof, to a point beyond the periphery of the adjacent wheel, and these arms or extensions of the side frames at each end are connected with like arms of similar side frames at the other side of the truck by transverse beams, thus completing the rectangular truck frame surrounding and enclosing the wheels.

In the construction shown, longitudinal tie bars connect the lower ends of the pedestals of each side frame, but it is indicated in the patent that these pedestal tie bars or "lower chord" need not be used, and obviously the main longitudinal beam forming the upper part of the side frame may be made of sufficient strength without further connection between the axle box pedestals.

The two side frames at the two sides of the truck are also connected near the middle of their length, and between the peripheries of the wheels of each pair, by transverse beams called transoms, there being sufficient space left between the two transoms to accommodate the bolster.

The second principal component, namely the bolster, is a transverse rigid beam lying between the transoms of the truck frame and having its middle portion above the level of said transom, and provided with a pivotal support for the car body, while at the ends the bolster extends to a point below the level of the side frame of the truck, and has a suspensory connection therewith by the appliances making up the third principal component of the truck, the length of the bolster in the part comprised between the side frames being a little less than the width of the space between the side frames and the width or thickness of the bolster in the direction lengthwise of the car being a little less than the width of the space between the transoms, so that while the bolster is confined within the space between the transoms and side frames of the truck frame which limit its relative movement in any direction, except the vertical, in which they guide it, the said bolster is, nevertheless, capable of having a slight movement in any horizontal direction relative to the truck frame on the suspensory devices which connect the two.

The third principal component, namely, the yielding and elastic appliances by which the bolster is suspended from and connected with the truck frame, is as follows, and I will, for convenience, describe the connection at one end only of the bolster, as that at the other end is precisely the same.

The end of the bolster which, as before stated, is below the longitudinal upper part of the side frame, rests upon the middle of a semi-elliptic spring, which lies below and approximately parallel with the side frame of the truck, thus being outside of the wheel gauge and with its ends near the axle box pedestals of the truck frame. Each of the said ends of the semi-elliptic spring is connected with the side frame above it by a link which derives its support from the side frame, and springs are interposed between the point of support of the links on the side frame and the point of support of the semi-elliptic spring on the link so as to afford vertical elasticity in the connection between the semi-elliptic spring and the side frame, the connection being such, furthermore, as to afford a capacity for swinging movement of the link relatively to the side frame in any direction, so as to accommodate movements of the bolster relative to the truck frame in the direction either lengthwise of the car or transverse thereto, or in any horizontal direction as may result from such longitudinal and transverse movement.

83 The parts thus far described constitute the principal and characteristic components of the truck, but among minor details it may be mentioned that the bolster near each end thereof is provided with a chair which, as specifically shown in the first Brill patent, is astride of the main longitudinal beam of the side frame and is provided at its top with side bearings to engage rub plates fixed to the bottom of the car body, and thus to sustain in whole or in part the weight of the car body and to prevent it from tipping sidewise upon its center pivotal support on the bolster, as might occur if no side bearings were provided. These chairs are provided with springs called thrust springs, which bear against the inner vertical edge of the beam of the side frame, and thus yieldingly resist the transverse swinging movement of the bolster relative to the truck frame, which is provided for in the suspending links which connect the bolster and semi-elliptic springs as one member, with the truck frame as the other of the two connecting members.

In the construction specifically shown in the first Brill patent the springs which afford the elasticity in the connection between the side frames and the ends of the semi-elliptic springs are interposed between two parts of the suspending link, the lower part of which is in the form of a stirrup or loop, while the upper part has a ball and socket connection with the side beam of the truck frame, so as to provide for the universal swinging movement of the link relative to the side frame to accommodate the movement of the bolster relatively to the truck frame, and the spreading of the semi-elliptic springs as they are flexed in performing their spring action.

Referring now to patent No. 627,900, which I will call the second Brill patent, it shows a truck having essentially the same components and the same mode of operation as the truck of the first Brill patent above explained by me, the second patent relating mainly to the construction of the links which support the ends of the semi-elliptic springs from the side frames.

As shown in the second patent, the springs which afford the vertical elasticity in the connection between the ends of the semi-elliptic

springs and the side frames, instead of being interposed between two parts of the link, as in the construction previously described in connection with the first patent, are interposed between the lower end of the links upon which they rest, and the ends of the semi-elliptic springs which rest upon said interposed vertically yielding springs.

The said links in the second patent are, however, made in two parts, which are pivotally connected together by a joint affording pivotal movement of the lower part of the link relatively to the upper part on an axis lengthwise of the truck. This pivotal joint

84 in the link enables the semi-elliptic springs, which are rigidly connected with the bolster, to swing in the direction transversely of the car without bringing torsional strain upon the spring, as the lower part of the link with which the semi-elliptic spring is connected may remain in approximately vertical position, while the upper part of the link becomes inclined to the vertical by reason of the transverse swinging of the bolster relative to the truck frame, the pivotal connection between the two parts of the link on the horizontal longitudinal axis permitting this movement of the two part of the link without bringing a bending strain thereon or subjecting the semi-elliptic spring to appreciable torsional strain.

The upper portion of the link is connected with the side frame of the truck so as to be capable of swinging in any direction to accommodate the bugitudinal and transverse swinging movements of the bolster relatively to the truck frame, this universal movement of the link being provided for by a ball and socket joint or connection between the link and the side frame of the truck.

Recess.

Q. 5. Have you examined "Complainants' Exhibit, Drawing of Defendant's Truck"? If yes, compare the truck structure therein represented with that described and shown in the Brill patents in suit, and state whether or not, in your opinion, said defendant's truck structure embodies the subject matter of any important claims of the said two Brill patents, and give your reasons for any opinion you may express.

(All reference to the said drawing is objected to, the same being incompetent and incorrect.)

A. I have examined the drawing referred to and understand the construction of the truck therein represented, which I will call "Defendant's truck."

I am of the opinion that said defendant's truck embodies substantially the same structural components combined and operated in the same way as those of the truck shown and described in the Brill patents referred to in my preceding answer.

Defendants truck, like that of the first Brill patent, is made up of three principal components, namely, first the truck frame; second, the bolster, and third, the yielding and elastic connection between the truck frame and the bolster, such that an adequate connection is afforded between the two, while shocks that would otherwise be transmitted from the wheels to the car body, are absorbed, so that the car body is made easy riding and comfortable for the occupants.

The first component of defendant's truck, namely, the truck frame, like the correspondent component of the Brill truck, is in the general form of a rectangular frame surrounding the wheels and comprising side frames having the axle box pedestals near their ends, containing the axle boxes upon which the said side frames are supported through the intervention of axle box springs. The side frames of defendant's truck have no pedestal tie bars, or lower chords, but are otherwise similar to the side frame of the truck shown in the first

Brill patent, the main beam connecting the upper part of the  
85 axle box pedestal and being above the level of the axle boxes.

In defendant's truck, furthermore, the same as in the truck of the first Brill patent, the side frames are extended beyond the axle boxes about at the level thereof to a point beyond the periphery of the adjacent wheel, and the arms or side extensions of one frame are connected with the corresponding arms of the side frames at the other side of the truck, thus completing the approximately rectangular frame surrounding the wheels. The side frames are also connected about midway of their length and between the peripheries of the wheels of each pair by transverse beams called transoms, there being sufficient space left between the transoms to accommodate the bolster.

The said bolster of defendant's truck, the second of the principal components referred to by me, like that of the truck of the first Brill patent, is a rigid transverse beam lying between the transoms of the truck frame and having its middle portion above the level of said transoms and provided with a pivotal support for the car body, while at its ends the bolster is provided with chairs extending to a point below the level of the side frames of the truck and having a suspensory connection therewith by the yielding and elastic appliances making up the third component of the truck. In defendant's truck, the same as of that in the first Brill patent, the portion of the bolster between the side frames is a little shorter than the distance between the side frames and is of little less width lengthwise of the car than the space between the transoms, so that the bolster is capable of a slight movement in any horizontal direction relatively to the truck frame on the suspensory devices that connect the two, although this movement is limited by the side frames and transoms which, however, admit of free vertical movement and afford a guidance for the bolster relatively to the truck frame in such vertical movement. In defendant's truck the chairs at the ends of the bolsters instead of embracing or striding the side frame of the truck frames, as in the construction shown in the first Brill patent, pass up at the inside of the side frames and are provided with thrust springs which act against the inner vertical edge of the beams of the side frames and thus yieldingly resist the transverse swinging movement of the bolster relative to the truck frame which is provided for by the suspensory character of the connection by which the bolster is supported upon the truck frame.

The third principal component of defendant's truck, namely, the yielding and elastic appliances for connecting the bolster and truck frame, the same as in the truck of the first Brill patent, are

composed of semi-elliptic springs which lie below the longitudinal beams of the side frames outside of the wheel base, and approximately parallel with the said beam, the bolster resting at each end upon the middle of the semi-elliptic spring at the corresponding side of the truck, while the ends of each semi-elliptic spring are near the axle box pedestals and are connected with the side frame by links, one at each end of the semi-elliptic spring, which links derive their support from the side frames and have springs inter-  
86 posed between their point of support upon the side frame and the point of support of the semi-elliptic spring on the link, so as to afford vertical elasticity in the connection between each end of the semi-elliptic spring and the side frame. In the defendant's truck, furthermore, the same as in the truck of the first Brill patent, the connection of the links to the side frames is such as to afford capacity for universal swinging movement of the links, so as to accommodate the movements of the bolster relative to truck frame, in either the longitudinal or transverse direction, or in any resultant of movements in these two directions, and so as to accommodate the spreading of the semi-elliptic spring as it is flexed in performing its spring action.

As appears from the foregoing analysis, defendant's truck clearly comprises the same essential components as those of the truck of the first Brill patent, combined and organized and operating in essentially the same way and producing the same results.

Referring to the claims of the first Brill patent it will be found that they all include the principal components above described by me as common both to defendant's truck and to the truck shown in the said Brill patent, namely, the truck frame supported upon axle boxes, the bolster directly supporting the car body, and the flexible and elastic suspensory connection between the bolster and the truck frame comprising the semi-elliptic springs and the links and springs by which the said semi-elliptic springs are supported from the side frame, the ends of the bolster being supported upon the middle part of the semi-elliptic springs.

In the first Brill patent the claims are very numerous and in many cases are differentiated from one another by details of construction which do not seem to be material in determining the substantial characteristics of the structure referred to. I will, therefore, refer to only two of the said claims in detail, namely, claims 13 and 81, which refer to the essential components of the truck shown in the patent, and contain no limitations as to details of such components which distinguish them from the corresponding components of defendant's truck.

Claim 13 is as follows:

"13. The combination in a car truck, of the side frames, the semi-elliptic springs movable and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described."

The elements referred to in said claim are first the side frames, that is, the side members of the main truck frame which contain the pedestals for the axle boxes; second, the semi-elliptic springs

which are specified in said claim as "movable and resiliently suspended from the side frames," *i. e.*, by the third element of the claim, namely, the links, and the vertically elastic springs included in the connection between each end of the semi-elliptic spring and the side frame; and the fourth element, namely, the bolster, secured to the said semi-elliptic springs.

Claim 81 is as follows:

87 "81. The combination in a car truck, of the side frames, the semi-elliptic springs, a cross bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames substantially as described."

(At this point, 3.30 P. M., H. S. Duell, Esq., counsel for defendant appeared.)

Claim 81 refers to the same elements as claim 13, but is more specific and definite with regard to the means by which the semi-elliptic springs are movably and resiliently suspended from the side frames, said means being definitely mentioned in claim 81 as links, and springs combined with said links.

Obviously defendant's truck contains the subject matter recited in both of the above quoted claims, namely, the side frames, the semi-elliptic springs, a cross bolster secured to the said springs, said semi-elliptic springs being "movably and resiliently suspended from the side frames," as recited in claim 13, and the specific devices by which they are thus movably and resiliently suspended being links and springs combined with said links as specifically referred to in claim 81, and the general organization and operative relations of all the said elements in defendant's truck being essentially the same as in the truck shown and described in the first Brill patent.

Specifically the links and springs employed as the movable and resilient suspension for the semi-elliptic springs from the side frames in defendant's truck differ in the structural location of the springs from the construction shown in the two Brill patents, although this difference in structural arrangement does not affect the function or operative relation of the same to the remaining elements, which is the same in defendant's truck as in the truck shown in the two Brill patents.

In defendant's truck the spring forming part of the suspension for the semi-elliptic spring from the side frame is interposed between the upper end of the link and the upper part of the side frame instead of, as in the first Brill patent, between two parts of the link vertically movable one relative to the other, or, as in the second Brill patent, between the lower end of the link and the end of the semi-elliptic spring, which rests upon said interposed spring. In all of these arrangements, however, the primary and essential function of the spring is to afford vertical elasticity in the connection between the end of the semi-elliptic spring and the side frame of the truck frame from which it is suspended by said connection, and I therefore regard the difference in location of the spring as entirely immaterial

so far as the subject matter referred to in claims 13 and 81 of the Brill patent is concerned.

In defendant's truck, the link, like that forming the subject of the second Brill patent, is made in two parts pivotally connected together by a joint having a longitudinal horizontal axis, so that the transverse swinging movement of the bolster and semi-elliptic springs may take place without bringing torsional strain upon the semi-elliptic springs, which may remain substantially horizontal during the swinging movement, which would cause the upper parts of the links to assume an inclined position.

Defendant's trucks, therefore, embody the distinctive feature forming the subject of the second Brill patent containing the subject matter referred to in claims 13, 14, 15 and 17 of said second Brill patent.

Claim 13 is as follows:

"13. In a car truck, the combination with the side frames of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally disposed semi-elliptic springs secured to the lower end of said bolts, a cross bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described."

The above claim refers to the same principal components as those forming the truck of the first Brill patent, but is distinguished therefrom by specifying that the links comprise bolts pivoted between their ends.

This refers to the longitudinal pivotal joint between the upper part of the link supported from the side frame and the lower part of the link which supports the end of the semi-elliptic spring, and the links in defendant's truck have a like joint between the upper and lower sections, serving a like purpose.

Claim 14 refers to the same elements as claim 13, but refers to the pivotal or jointed construction of the links by the following expression: "said links comprising a plurality of sections pivotally secured together." Obviously defendant's links have a similar construction, they comprising each a plurality of sections, *i. e.*, an upper section and a lower section, pivotally secured together in substantially the same way and serving substantially the same purpose as the like construction shown in the second Brill patent.

Claim 15 also refers to the principal components of the truck, and specifies the devices that connect the semi-elliptic springs with the side frame as "articulated and pivotal links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs on the side frames." Obviously the above specified characteristics are equally embodied in the links and springs that suspend the semi-elliptic springs from the side frames in defendant's truck.

Claim 17 also refers to the principal components of the truck, but does not specifically describe the springs included in the connection between the semi-elliptic springs and the side frames of the truck



frame. In claim 17 the links are referred to as "depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links." The said characterization is equally appropriate for the construction embodied in defendant's trucks,

89 wherein the links depend from and are flexibly supported on the upper chord of the longitudinal member of the side frame and pass down through large apertures therein, and are articulated or jointed between their upper and lower portions and have the semi-elliptic springs rest upon the lower portions below the joint essentially the same as shown in the second Brill patent.

#### Cross-examination.

By Mr. DUELL, without waiver of objections:

(Counsel for defendant requests counsel for complainants to state upon the record whether he relies upon any other claims of either patent than those mentioned, namely, the 13th and 81st of the parent patent, and 13, 14, 15 and 17 of the second Brill patent.

Complainants' counsel replies that for the purpose of cross-examining this witness, it does not seem to him that this information need be placed upon the record at this time.

In view of the fact that there are 130 claims in the two patents in suit, counsel for defendant feels that something more than a side-stepping answer should be given, if for no other reason but for the purpose of shortening the record, inasmuch as otherwise it must naturally be extended by a very full cross-examination. Counsel for complainants is reminded of his many assumptions, both on and off the record, of an apparent desire to diminish the expense, as well as the size of the record, to as narrow limits as possible. An opportunity is accordingly given him of showing his good faith.

In the absence of a reply from complainants' counsel, which is regretted, counsel for defendant proceeds *de bene esse*.)

R. X Q. 6. Are you the same Joseph P. Livermore who testified in the suit of *John A. Brill vs. The North Jersey Street Railway Company*, in the U. S. Circuit Court of the District of New Jersey, based upon the same two letters patents involved herein?

A. Yes.

R. X Q. 7. Are you aware that claims 6, 10, 11, 13, 14, 15, 30, 80, 81 and 87 of Letters Patent No. 627,898, parent patent herein, and claims 13 and 17 of Letters Patent No. 627,900, the second Brill patent herein, were there involved and relied upon, and that all of said claims have been held invalid for lack of patentable invention, as well as not infringed, by the U. S. Circuit Court of Appeals for the Third Circuit?

A. I am aware that those claims were, in some part of the procedure at least, relied upon by the complainant, and I am also aware that the decision of the Circuit Court of Appeals was adverse to the complainant. My impression was that the claims of the first patent were held to be invalid, and consequently the question of infringe-

ment, strictly speaking, as a separate question, was not considered by the court. My impression is that in the second patent the claims were held not to be infringed by the defendant's structure.

R. X Q. 8. Where did you get that impression in respect to the second patent?

90 A. That is my recollection from reading a copy of the opinion of court. I did not, however, endeavor to fix in my mind the exact grounds for the decision on all points.

R. X Q. 9. Do claims 13 and 17 of Letters Patent No. 627,900 rest upon a like combination with claim 13 of Letters Patent No. 627,898?

A. As I understand, claim 13 of patent 627,900 refers to a construction or combination which embodies the subject matter referred to in claim 13 of patent 627,898, but contains additional limitations. In other words, a structure embodying the subject matter of claim 13 of patent 627,900 would be included within the scope of claim 13 of patent 627,898, but a structure might be included within claim 13 of patent 627,898, which would not be included within the scope of claim of patent 627,900.

I do not, however, see that a like relation exists between the subject matter of claim 17 of the patent 627,900 and claim 13 of patent 627,898.

While certain constructions might include the subject matter of both of these claims and be included in the scope of each, I think that there might be structures included in the scope of each which were not also included within the scope of the other.

R. X Q. 10. In brief then, claim 13 of patent 627,898 specifies a combination broadly which claims 13 and 17 of Letters Patent 627,900, specify with certain limitations, does it not, as far as the matter involved in this suit is concerned?

A. That is substantially my view of the matter.

Adjourned to meet at the same place Tuesday, April 4, 1905, at 10.30 A. M.

POST OFFICE BUILDING, PHILADELPHIA,

April 4, 1905—10.30 a. m.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., U. S. Commissioner; Francis Rawle, Esq., for Complainants; H. S. Duell, Esq., for Defendant; Joseph P. Livermore, the witness.

X Q. 11. Isn't it true that not only claims 13 and 17 of Letters Patent 627,900 rest upon a like combination with claim 13 of Letters Patent 627,898, but also claims 14 and 15 of the former and claims 6, 10, 11, 13, 14, 15, 30, 80, 81 and 87 of the latter, do likewise, so far as the matter involved in this suit is concerned?

A. With reference to the relation of claims 14 and 15 of patent 627,900, to claim 13 of patent 627,898, my view is that said relation is the same as set forth in my answer to X Q. 9, with reference to claim 13 of each of the said patents.

91 With reference to the list of claims of patent 627,898, referred to in the question, I understand that they all do refer

to essentially the same combination, shown and described in the patent, as that which is referred to in and form the subject of claim 13 of said patent 627,898.

X Q. 12. Don't claims 14 and 15 of patent 627,900 involve, with possibly certain limitations, the combination of claim 13 of patent 627,898, so far as the matter involved in this suit is concerned, and if so, do they not fall within the list previously stated in your last answer?

(This question and the preceding question are objected to as not proper cross-examination; as not relating to matters inquired of in the examination in chief; and as relating to matters not within the scope of the examination of an expert witness. The first question was asked and answered before complainants' counsel appeared, he having requested that the testimony proceed, reserving his right to object.)

Defendant's counsel states that no reservation was made in his presence; in other respects the objection carries its own answer.)

A. That is my view of the matter. That is, any structure that embodied the subject matter of claim 14 and 15 of patent 627,900 would embody the construction forming the subject of claim 13 of patent 627,898, and would come within the scope of said claim.

X Q. 13. What essential differences are there, if any, between the construction illustrated in "Complainants' Exhibit, Drawing of Defendant's Truck," purporting to illustrate the truck used by the defendant herein, and the construction shown in the old blue print drawing marked for identification, purporting to illustrate the truck used by the defendant in the North Jersey case, so far as the position taken by you is concerned?

(This blue print not being in evidence, the question is objected to.)

Defendant's counsel states that at the proper time the same will be introduced in evidence, if deemed necessary.)

A. I do not find any essential differences between the constructions represented in the two drawings referred to.

X Q. 14. Have you given your deposition in this case with a knowledge of and in the light of the prior art, or have your various statements relative to the problems to be overcome in the manufacture and use of car trucks been based upon theory?

A. I have had some knowledge of the prior art, derived in part from my work in the North Jersey case, where the same subject matter was involved.

In giving my present deposition, however, I have had no occasion to consider the prior art and have not refreshed my memory with reference thereto, as I was merely called upon by the questions to describe the structures shown in complainants' patents, and in the drawing of defendant's truck. The various statements which I have made with reference to the requirements to be met and the nature of the appliances by which they are met in the concrete structures considered by me were based upon my general knowledge of mechanical contrivances and upon my general knowledge and observation of railroad car trucks in actual service.

92 X Q. 15. Is motor suspension and location a part of the problem of truck construction?

(Objected to as not proper for cross-examination.)

A. It is to the extent that when the trucks are to be used with motors the proper accommodation of the motor must be provided for, as well as the matter of affording a proper support for the car body. There might be trucks which would be suitable and efficient merely for supporting the car body if the motive power were provided outside of the truck, which would be unsuitable and could not be used if the motive power were to be applied to the wheels of the truck by motors, such as are commonly used for that purpose.

X Q. 16. Your last answer raises the inference that trucks adapted to be used with motors are merely a part of the broad truck art, which would include trucks of almost any character, as for instance, those used upon steam roads, as well as possibly the truck or running gear of other vehicles; is that correct?

(Same objection.)

A. I consider that the trucks adapted to be used with motors are a class or species of trucks in general, such, for example, as are used upon steam roads, or upon any vehicles employing a truck as a part of their running gear.

X Q. 17. Then the problem of properly supporting the motor so that it will not be subject to excessive jars, shocks and strains, must be met as a part of truck construction, just as much and in a similar connection, as the problem of properly supporting the car body, so as to obviate the same dangers, must it not?

(The same objection is made. Notice of motion is given to strike from the record this entire line of cross-examination and to tax against the defendant the costs thereof.)

Counsel for defendant desires to state that one of the obvious answers to such repeated and unreasonable objections is that defendant has a clear right to ascertain the scope and character of the knowledge of the witness with respect to car trucks and other matters about which he has testified; and further to lay a proper foundation for his examination as to the 130 claims in the two letters patent herein involved, as to which claims counsel for complainants has refused to specify those upon which infringement is predicated. This, particularly, in view of the fact of the witness's testimony in the North Jersey suit.)

A. The problem of properly supporting the motor must, of course, be met, and it must be provided for in the truck, and commonly some part of the truck construction is involved in the proper support of motors.

I do not, however, regard the requirements of motor support and of car body support as being the same, nor the dangers to be obviated as being the same, except in the most general way, namely, that adequate support must be provided for each, of as great durability and efficiency and exemption from damage or breakage as is practically attainable.

93 X Q. 18. In effect then, the problems are the same, except that they may differ as to degree, or perhaps, because of the different positions of the motor and the car body with reference to the top frame of the truck.

(Same objection. Same notice.)

A. On the contrary, to my mind, the problems are totally different, except, of course, that each involves the proper support for a mechanical structure.

X Q. 19. Point out any essential difference?

(Same objection. Same notice.)

A. The problem involved in reference to the motor is that it may be sustained so that connections can be made from its driving shaft to the wheels or wheel axles of the vehicle. In the construction which has come to be commonly adopted, and I think universally on railways, the motor frame is journaled directly upon the axle of the pair of wheels to be driven by it, said axle forming the principal support of the motor, while another point on the motor frame is commonly supported by a spring connection from some part of the running gear, commonly a part of the truck, utilized or provided for that purpose.

The problem of properly supporting a car body upon a truck involves the production of an adequate structural support from the wheel journals to the car body, such as to accommodate the relative movement required in the movement of the car along the track, and such as to exempt the car body, as far as practicable, from strain, shocks and the like, due to unevenness in the rails along which the wheels travel.

I know of no better way to state the essential differences between the two problems which seem to be totally unlike, except that both are mechanical, structural problems.

They seem to me no more alike than the problem, for example, of designing and building an arm chair and the problem of designing and building a house. Possibly these problems might be regarded as the same and differing only in degree, but to my mind, they do not appear so.

X Q. 20. Wouldn't the analogy be closer to say that the problem of supporting a motor so as to exempt it like the car body from strains, shocks and the like, finds its counterpart, to a certain extent, as far as your analogy goes, in properly supporting the roof upon a house and one of the floors within it?

A. It does not seem to me that it would. These are questions of opinion, or point of view, rather than of fact, and from my point of view the problems involved in obtaining proper motor support are far different from those involved in obtaining the proper support of the car body upon the wheels through the truck structure.

I do not agree that the principal problem involved in motor support is to exempt it from strains and shocks, although, of course, the support should not be made so as to subject it to unnecessary strain or even unnecessary shock. As a matter of fact, the motor commonly

is subjected to the shocks that come through the wheels from the road bed, as a very substantial part of the weight of a motor is supported by rigid metal to metal construction directly on the wheel axles. The outer end of the motor is commonly yielding-  
 94 ingly supported, not so much to contribute to its ease and comfort, as to transmit the torque to the wheels somewhat yieldingly, or in other words, to permit a slight rotary movement of the motor around the journal or axle upon which it is sleeved, and to produce a gradually increasing resistance to said movement and shortly to arrest it wholly, so that the torque of the motor will be applied entirely to rotating the wheel axle.

(Counsel for defendant now requests counsel for complainants to state upon the record whether he relies, or will rely at the final hearing, upon any other claims of either patent than those specifically mentioned by the witness.)

Counsel for complainants states that as at present advised he will reply at the final hearing only on such claims.

Counsel for defendant will accordingly limit his cross-examination on the claims of the two patents to those specifically mentioned.)

Recess.

X Q. 21. Are you aware that complainant in the New Jersey suit admitted in open court, which admission was later embodied in the opinions of both courts, that unless the 13th claim of Letters Patent 627,898, could be sustained, none of the claims there in suit could be?

(The question is objected to, first, because the first statement is erroneous.

The question is withdrawn and proof thereof will be made at the proper time.

This statement is objected to as irregular and improper to be placed upon the record.)

X Q. 22. What do you consider the gist of the invention of the two patents in suit; that is, what one of the elements entering therein contains in the entire relation the gist of the invention?

(Objected to as not proper for cross-examination, the witness having testified only as to the mechanical structure covered by the patents in suit and certain claims thereof and compared the same with the defendant's structure. Further, as questioning the witness in regard to matters not properly comprehended within his scope as an expert witness. The same notice is given.)

A. According to my understanding, the gist of the invention of the first Brill patent, No. 627,898, lies in the entire organization of the truck, comprising the truck frame, the bolster, and the intermediate appliances connecting the truck frame and bolster, and not in any one element thereof.

Since, however, trucks have commonly been made comprising a truck frame and a bolster, and intermediate connections, I should consider that the truck of the first Brill patent was characterized

mainly by the nature of the connections between the bolster and the truck frame, namely, by the semi-elliptic springs and the springs and links suspending them from the side frame, and in the  
95 structural character of the truck frame and bolster which adapt them to the structural combination with the said connection.

As to the second Brill patent, No. 627,900, the invention, as I understand it, involves that forming the subject of the first Brill patent, but is an improvement thereon, the gist of the improvement, briefly stated, consisting in the jointing of the links forming part of the connection between the bolster and the truck frame, and in the structural arrangement of the links relative to the side frame, consisting in supporting the links upon the side frame and having them pass down through the large openings in side frames, which accommodate the universal swinging movement of the links on the side frames.

X Q. 23. Are you aware that truck constructions have long been known which comprise a truck frame having side frames, a bolster, longitudinally arranged semi-elliptic springs, supporting the ends of the bolster, and non-elastic links, jointed for transverse swinging, to connect the ends of the semi-elliptic springs with the side frames; and that constructions have long been known embodying the combination of truck frames having side frames, a bolster, longitudinally arranged equalizers supporting the ends of a bolster, and elastic links or elastic or extensible suspensions connecting the equalizers with the side frames, and if so, do you care to amend your statement as to the gist of the invention?

(Same objection and same notice as to X Q. 16.)

A. I am aware that a truck construction, such as would correspond to the description first given in the question, was disclosed a good many years ago, but I have never seen such a truck structure, and have never known or heard of any being built for practical use or put into use.

I am also aware that a truck corresponding to the description given in the question of the second truck therein referred to was devised some time prior to the time of Brill's patents here sued upon, and my understanding is that such trucks were actually constructed and used.

I see no reason to and do not care to amend my answer to X Q. 22 in view of my knowledge of the matters set forth in my present answer.

X Q. 24. As a matter of fact, doesn't the gist of the invention lie, if indeed there is any invention at all herein involved, either in the substitution of an elastic for a non-elastic link or hanger, or in the substitution of a semi-elliptic spring for a rigid equalizer, and if not, why not?

(Same objection and same notice.)

A. The question of what constitutes invention or wherein, if at all, invention lies in the production of a new thing is, as I under-



stand, a matter of law and not of fact nor of mechanics, and is out side of my province.

I believe it has been held by the Circuit Court of Appeals in the Third Circuit that the invention, if there were any, lay in the substitutions as stated in the present question, and that patentable invention was not involved in such substitution.

I assume that that is an authoritative answer to the present question, unless or until some conflicting opinion is rendered by some other tribunal of equal weight, or by one of higher authority.

96 X Q. 25. Referring to claim 17, of the second Brill patent in suit, No. 627,900, I would like to have you explain where you find "links depending from and flexibly supported on said upper chord."

A. In the links 26 supported by the ball and socket joint at 24 on the side frames 25.

I do not think that the term flexible is precisely appropriate to the construction, but it evidently refers to the capacity for free movement in all directions of the link upon the point of support.

X Q. 26. Please explain what is meant by a "spring link," or a link which is extensible.

A. The term *link* is commonly used to designate something which connects or ties together two parts, and is subjected to tensile strain in holding the parts together. A *spring link* is one comprising a spring in the connection between the two parts tied together by the link, which spring is subjected to and yields under the strain tending to separate the parts tied together by the spring link. Such a spring link is *extensible* because the length between its points of engagement with the two parts tied together by it may be varied and is extended when the strain tending to separate the parts increases and the spring forming a part of the link connection yields to the increased strain.

X Q. 27. Do any of the claims specified by you embody the feature of a free longitudinal swing of the links relative to the length of the truck?

A. None of the claims refers specifically to the capacity for longitudinal swinging of the links. The links shown and described, however, in both patents have capacity for swinging in the longitudinal and transverse directions, and in any direction which is a resultant of these two combined, and no other form of link is shown in the said patent.

X Q. 28. The links shown and described also show spiral springs in combination therewith below the side frame or top chord, do they not? And no other form of link is shown or described, is it?

A. Yes, as shown in both patents, the spiral springs that are in combination with the links are located below the side frames, and no other location of said springs is shown.

X Q. 29. The amount of elasticity of the links must be sufficient to make operative and accomplish the avowed purpose of the presence of the spiral springs, must it not? That is, sufficient to allow of participation in the absorption of shocks, initial strains, etc.

A. Their elasticity must be such that their elastic action will take place under the conditions incident to their use.

X Q. 30. Do you know whether or not it is true that metal jarring against metal tends to cause a crystallization thereof with a consequent danger of breakage?

(Same objection and same notice.)

A. I know that, as a general thing, jarring or repeated impact against steel tends to crystallize the same and render it more brittle, and therefore more liable to breakage. The same is true of  
97 some qualities of iron, and may be of some other metals, but I do not know that it is true of metals in general.

X Q. 31. What is the purpose and function of the spiral springs used in connection with the links shown in the patents in suit?

A. Most generally stated, it is to render the connection of the parts connected by the links (that is, the side frames and semi-elliptic springs) yielding. The purpose of making this connection yielding is to contribute to the absorption of the shocks which the wheels receive, so that the shocks will not be transmitted to the car body as they would if nothing but rigid connections were employed between the axle boxes and the car body. More specifically the function of the spiral springs in the links is to accommodate the movement of the wheels individually, as when one wheel encounters a shock not encountered by the others, or when, for example, the condition of the road bed is such that the two axles have different inclinations from a horizontal plane. Under such conditions the spiral springs combined with the links contribute to the distribution or equalizing of the strains which would otherwise be concentrated upon one arm of the semi-elliptic spring, tending to strain it unduly and to produce various strains in the structure that are eliminated by the action of the springs combined with the links.

X Q. 32. If car truck frames are, as you have stated, of a rigid construction and substantially rectangular in form, how can two car axles have different inclinations from a horizontal plane without either both wheels on one side of the truck being raised with the frame, thus obviating such a difference of inclination, or without such initial difference being absorbed by one of the spiral springs in the journal boxes? In other words, I don't see how the spiral springs in connection with the links have anything to do with this.

(Same objection and same notice.)

A. The truck frames, although of rigid construction, that is, unprovided with any joints or provision for yielding of one part relatively to another, are not absolutely rigid and could not be made so without very excessively heavy construction. When one wheel is raised above the plane of the other three, its upward movement is largely accommodated by the further yielding or compression of the axle box spring over that wheel. This, however, brings an excessive upward pressure at that corner of the truck frame and distorts the truck frame from its normal form, overcoming the rigidity of the cross beams at the ends of the side beam, and of the fastenings at the four corners of the frame. Under such conditions

the spiral spring in the link at the adjacent end of the side frame comes especially into action to relieve the arm of the semi-elliptic or excessive strain.

Furthermore, the spiral springs in the links relieve the semi-elliptic springs of the unequal strain that would otherwise be produced when both sides of the truck frame are drawn down at one end relative to their condition at the other end, as occurs under the strain of applying the brakes.

98 X Q. 33. Please explain the meaning of articulation as applied to the links of the patents in suit and the function thereof.

A. The term "articulation" is employed only with reference to the links of the second Brill patent, and refers to the joint formed in the link by which the lower part of the link which supports the semi-elliptic spring may have a pivotal movement on a horizontal axis lengthwise of the truck relatively to the upper part of the link which is supported upon the side frame of the truck. Referring to the drawing, the articulation referred to is at the joint where the pin or bolt 30 connects the upper and lower portions of the link (26 and 27) together.

X Q. 34. Where do the links of the patents in suit get their primary support?

A. From the side frames, in the socket formed in the upper part of the side frames.

X Q. 35. Where do the links of the truck purported to be illustrated by "Complainants' Exhibit, Drawing of Defendant's Truck" get their primary support?

A. The non-extensible part of the link is supported on the cap plate on the upper end of the spring supported on the side frame. I should regard the side frames as being the primary support for the link in defendant's truck in the same sense that they are in the truck of the patents sued upon.

X Q. 36. Inasmuch as the top plate, the pin running through the eye in the link, and the spiral spring seem to be the securing means whereby the link is connected to the side frame, possibly that might be termed primary; but in a stricter sense, is not the spiral spring in connection with the top plate the primary source of support?

A. I don't know. This seems to me to be a question of the definition of the term "primary." I suppose that if a chair leg were in direct contact with the floor, it would be proper to call the floor the primary support for the chair leg. If, however, the chair leg had a caster in its lower end, I don't know whether it would be more proper to call the floor the primary support or to call the caster the primary support.

X Q. 37. Referring to "Complainants' Exhibit, Photograph of Defendant's Car," which shows a leaf spring, the bottom side of which is substantially parallel with the track and with the side frame thereabove, connected to said side frame by links or bolts which appear substantially vertical thereto, I ask you whether or not this leaf spring is in effect in function an equalizing bar?

A. I regard the leaf spring, represented in the exhibit shown me, like the semi-elliptic springs of the truck shown in the Brill patents,

as performing the function of what is commonly known as an equalizing bar, that is, they divide the weight borne upon their middle part approximately equally between the two supports at the ends. I consider them as being in effect elastic equalizing bars.

X Q. 38. Referring to page 4, line 19, of Letters Patent 627,898, doesn't this line and those following indicate that the truck shown and described is a side-bearing and not a center-bearing truck;

that is, is not the weight of the car purposed to be carried 99 at the sides and not at the center?

A. Yes, the paragraph between lines 19 and 36, page 4, of the specification, states in substance that the truck is a side-bearing and not a center-bearing truck.

X Q. 39. Doesn't "Complainant's Exhibit, Drawing of Defendant's Truck" illustrate a bolster which fits between the truck transoms at either side thereof, as closely as is consistent with an upward and downward movement?

A. It illustrates one having sufficient space at each side of the bolster to give perfect freedom of up and down movement and only a comparatively small movement widthwise of the bolster between the transoms. I should judge that the space is about as small as would naturally be made if the purpose were merely to provide for up and down movement and there was no necessity for preventing movement in the direction of widthwise of the bolster. If the purpose were merely to allow freedom of vertical movement, while wholly preventing widthwise movement, the fit would be much closer, and there would be practical contact between the bolster at both sides and the adjacent transoms.

X Q. 40. Do you speak from theory or absolute knowledge, or, possibly as a third possibility, belief, not founded on either?

A. I am speaking of what is shown in the drawing before me, and from actual knowledge of mechanical constructions made from drawings.

X Q. 41. Can you point out anything in the drawing or anything founded upon any actual knowledge, which you may have of the truck, purporting to be illustrated thereby, which indicates what "would be" the clearance allowed?

A. The figures all show, where they show the relation of the parts at all, a space between the transom and bolster at both sides of the latter. The dimension of this space is not given. The small figure at the lower right hand corner designated "section on C-D" shows this relation best, and I should judge that the space represented at each side in this figure is about a thirty-second of an inch, and that in scale the drawing is about one-third of the actual size, so that a space of approximately three-thirty-seconds of an inch is indicated as clearance at each side of the bolster in the actual structure. I have no personal knowledge of the actual structure from which the drawing was made.

X Q. 42. Referring to the links shown in Letters Patent No. 627,900, wherein there appears to be two bolts comprising said links, pivotally connected by a pin, I would ask whether these two bolts are the ones indicated by the four claims of the patent in suit, and

whether the pin passing through eyes in each constitutes the pivotal connection?

A. Yes, the two bolts, 26, 27, are the two parts of the link, and the pin 30 in connection with the eyes formed in the ends of the bolts is the pivotal joint between the two parts referred to in the said claims.

X Q. 43. In all the links shown in both patents in suit the links themselves are not extensible, are they, but merely the springs in connection therewith?

100 A. This depends on what is included in the term link.

The links are in all cases made of a non-extensible part and a spring so as to render the connection between the two parts connected by the link extensible. Such a contrivance might appropriately be called, as a whole, a spring link, in which case the link is extensible, or it might, from another point of view, be called a link and a spring, in which case the link, exclusive of the spring, is not extensible.

Cross-examination closed.

(Signed)

JOSEPH P. LIVERMORE.

Adjourned subject to notice.

Sworn and subscribed to before me this fourth day of April, 1905.  
SAMUEL BELL, *Err.*

Continuation of proofs in behalf of the complainants, pursuant to short notice, before John A. Shields, Special Examiner, at the office of Joseph L. Levy, of counsel for the complainants, No. 203 Broadway, New York City, Borough of Manhattan, New York, Friday, April 14th, 2 P. M.

Present: Warfield & Duell, of Counsel for Defendant. Joseph L. Levy, on behalf of Complainants.

Complainants offer in evidence Patent Office copy of the United States Patent, granted to Charles F. Uebelacker, dated October 31, 1899, No. 635,986, and assigned to the Peckham Motor Truck and Wheel Company, and the same is marked "Complainants' Exhibit, Uebelacker Patent No. 635,986."

(Counsel for defendant objects to the receipt of the above copy of the said Letters Patent in evidence as being incompetent, irrelevant and clearly improper, particularly so in complainants' *prima facie* case not having been pleaded, and notice of motion to strike the same from the record is hereby given.)

Counsel for complainants also offer in evidence a printed copy of the record of the Interference, No. 19,528, between Charles F. Uebelacker and George Martin Brill, and the same is marked "Complainants' Exhibit, Uebelacker-Brill Interference Record."

Complainants' counsel states that the certified copy of this Interference Record is in evidence in the case pending in the United States Circuit Court of the District of New Jersey, between John A. Brill and the North Jersey Street Railway Company.

(Same objection and notice as before. Counsel for defendant states that in the interest of shortening the time of taking testimony, and out of deference to the wishes of counsel for complainants, for which reason short notice has been accepted, he will stipulate that the copy of the Interference Record in question is a correct copy of the certified one on file in the North Jersey suit, subject to correction at any time as the facts may appear.)

Complainants' counsel give notice that they stand ready to attend the taking of proofs on behalf of the defendant in this case continuously from day to day from the day of closing of the complainants' proofs in chief.

Complainants rest their proofs in chief.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

UNITED STATES OF AMERICA,  
*Southern District of New York, ss:*

I, John A. Shields, Special Examiner in the above entitled cause, do hereby certify that on the day indicated in the foregoing testimony, at the office of Joseph L. Levy, Esq., No. 206 Broadway, New York City, I was attended by Messrs. Warfield & Duell, of counsel for the defendant, and by Joseph L. Levy, Esq., of counsel for complainants, and thereupon the proceedings set forth took place.

And I do hereby certify that the exhibits introduced in the taking of said testimony are returned herewith.

And I do further certify that I am not of counsel nor attorney for either of said parties, nor in anywise interested in the event of the cause in said caption named.

In testimony whereof, I have hereunto set my hand this eighteenth day of April, in the year of our Lord one thousand nine hundred and five, and of the independence of the United States the one hundred and twenty-ninth.

(Signed)

JOHN A. SHIELDS,  
*Special Examiner.*

(Here follow diagrams marked pages 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124.)

No. 627,898.

Patented June 27, 1899.

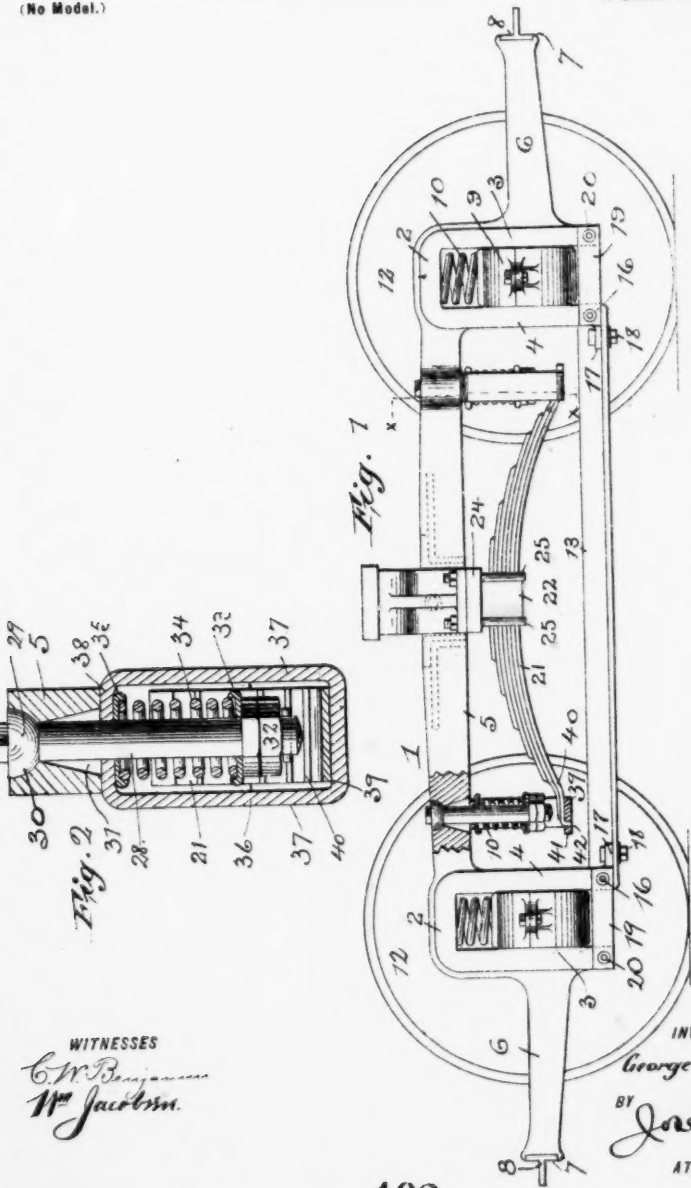
G. M. BRILL.

CAR TRUCK FOR MOTOR PROPULSION, &c.

(Application filed July 3, 1897.)

5 Sheets—Sheet 1.

(No Model.)



WITNESSES

C. W. Benjamin  
W. Jacobson

INVENTOR

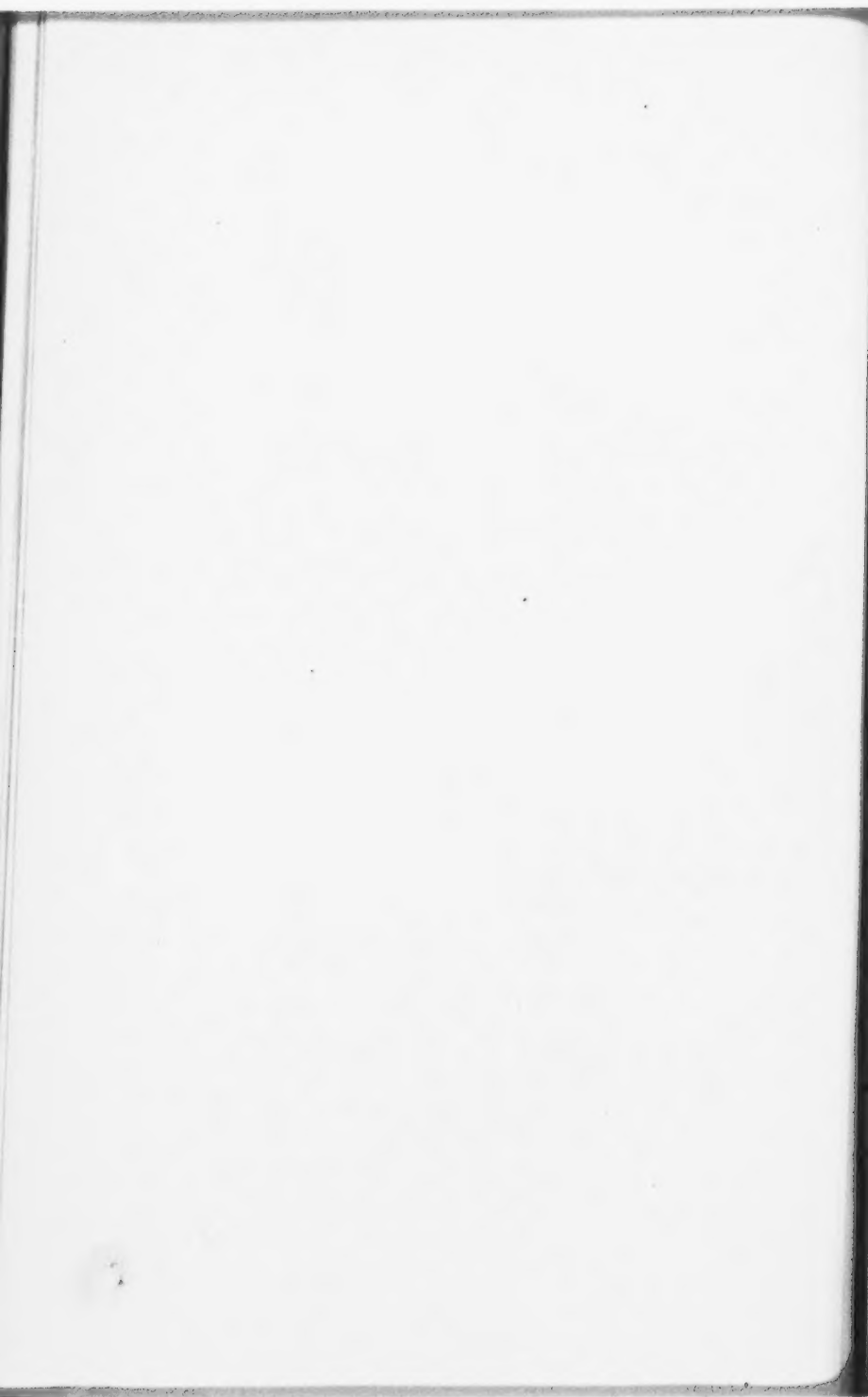
George M. Brill

BY

Joseph L. Lee

ATTORNEY





No. 627,898.

Patented June 27, 1899.

G. M. BRILL.

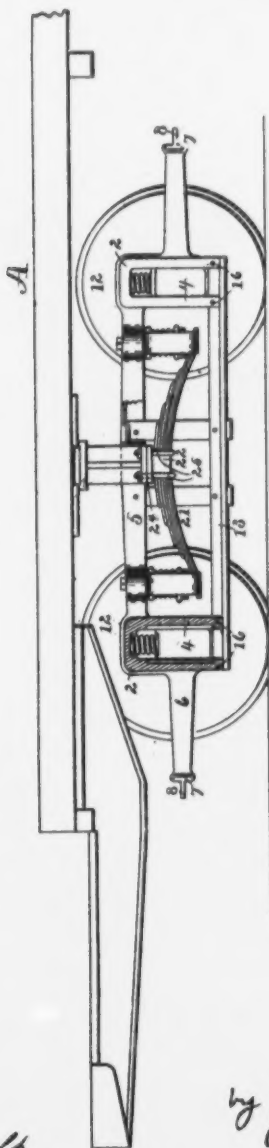
CAR TRUCK FOR MOTOR PROPULSION, &c.

(Application filed July 9, 1897.)

(No Model.)

5 Sheets—Sheet 2.

FIG. 3.



Witnesses  
O. H. Blakelock,  
John H. Hall

Inventor  
Geo. M. Brill,  
by Joseph L. Levy,  
Attorney



No. 627,898.

Patented June 27, 1899.

G. M. BRILL.  
CAR TRUCK FOR MOTOR PROPULSION, &c.

(Application filed July 9, 1907.)

(No Model.)

5 Sheets—Sheet 3.

FIG. 4.

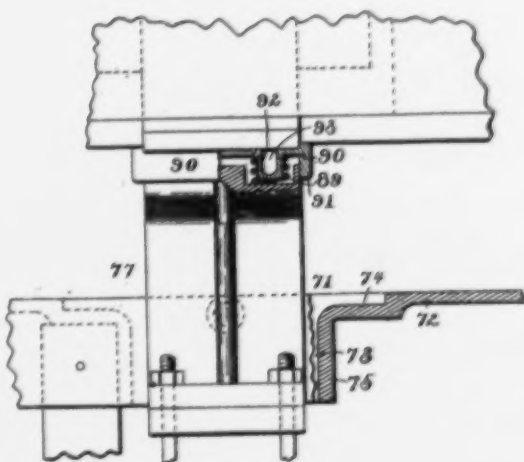


FIG. 7.

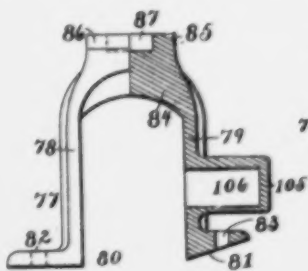


FIG. 8.

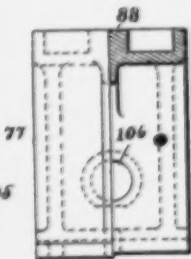
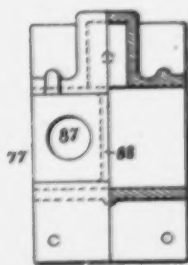


FIG. 9.



Witnesses  
D. H. Blakelock  
John H. Halse

Inventor  
G. M. Brill,  
by Joseph L. Levy,  
Attorney



No. 627,898.

Patented June 27, 1899.

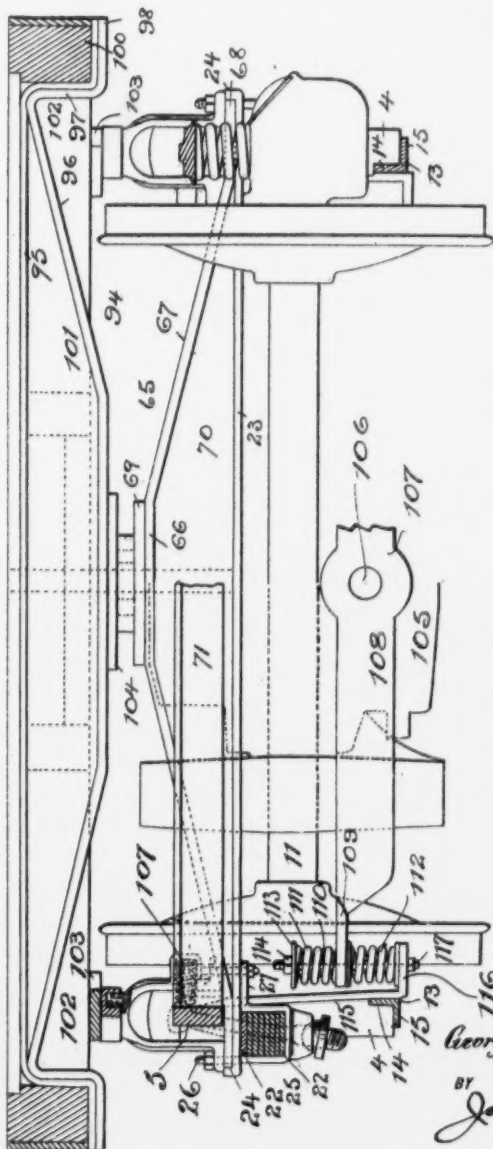
G. M. BRILL.  
CAR TRUCK FOR MOTOR PROPULSION, &c.

(Application filed July 8, 1897.)

(No Model.)

5 Sheets—Sheet 4.

Fig. 5.



WITNESSES

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No. 627,898.

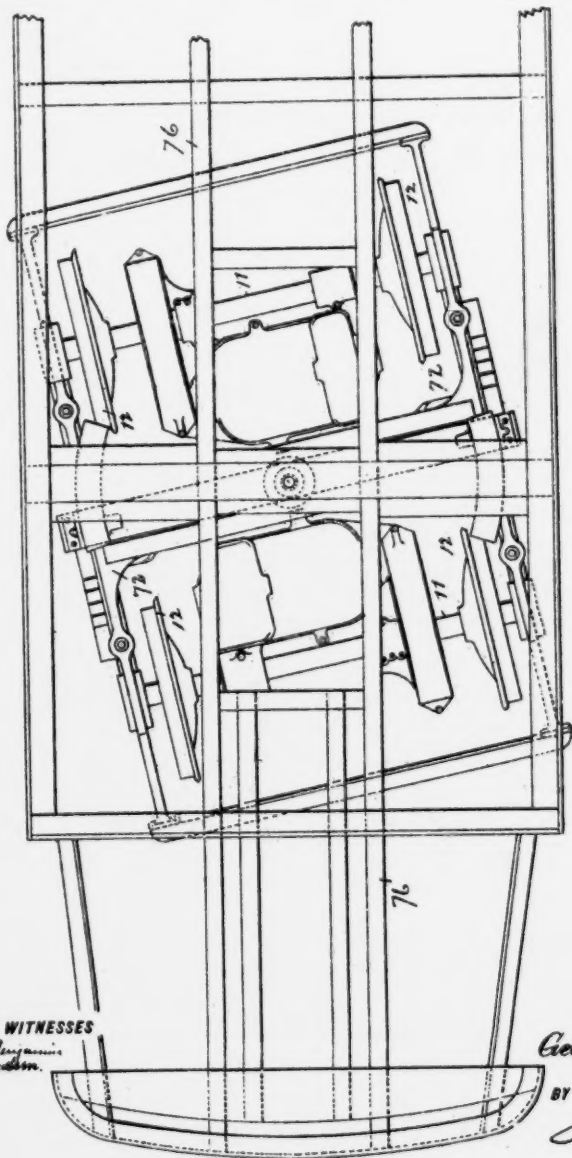
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# UNITED STATES PATENT OFFICE.

GEORGE M. BRILL, OF PHILADELPHIA, PENNSYLVANIA.

## CAR-TRUCK FOR MOTOR PROPULSION, &c.

SPECIFICATION forming part of Letters Patent No. 627,898, dated June 27, 1899.

Application filed July 2, 1897. Serial No. 942,329. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. BRILL, a citizen of the United States, residing at the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have made certain new and useful improvements in Car-Trucks for Motor Propulsion and the Like, of which the following is a specification.

My invention relates to improvements in car-trucks generally, and it has special relation to improvements in car-trucks designed for the purpose of carrying a motor for electric propulsion and the like.

My invention consists in the construction and combination of parts hereinafter described and further pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a truck embodying my improvements; Fig. 2, a sectional elevation, enlarged, taken substantially on the line *x x*, Fig. 1, illustrating the construction of one of the spring link-hangers; Fig. 3, a side elevation of a truck embodying my improvements, partly in section, and a portion of the car-body mounted thereon. Fig. 4 is an enlarged side elevation of a portion of the truck-frame, the side bearing-yokes, and a portion of the car-body. Fig. 5 is an enlarged end view of the truck and a portion of the car, the car being partly in section and the truck being in section on two transverse planes. Fig. 6 is a plan view of the truck and a portion of the car-body. Fig. 7 is an enlarged side elevation of the side bearing-yoke, one-half of which is in sectional elevation centrally and transversely thereof. Fig. 8 is a front elevation of the side bearing-yoke, one-half of which is in sectional elevation substantially through the center thereof. Fig. 9 is a plan view of the same, one-half being in longitudinal section.

Similar numerals of reference indicate corresponding parts throughout the several views.

The frame of the truck, which as to its general features I make no claim in this application, consists substantially of the side frames 1, each frame having inverted-U-shaped axle-box yokes 2 of the usual form, except as hereinafter described, each yoke having depending inner and outer box-controlling arms 3 4, a side bar or upper chord

5, uniting the yokes at or near the top thereof, and extensions 6, leading outwardly from the yoke-arms 3, between the limits of said arms, said extensions having recesses 7 in their ends, in which is seated a T-iron cross-bar 8 at each end to unite the side frames into one complete truck-frame.

In the axle-box yokes or pedestals are axle-boxes 9, and between the tops of the boxes and the upper portion of the yokes 2 are springs 10, and at 11 are the axles and 12 the wheels, all of the usual or desired construction.

Certain parts of the construction of the side frames are embodied in the improvements which I have made, as follows: Instead of the usual pedestal tie-bar I have adopted a stronger and much more economical form of construction, and have employed an angle-iron 13, extending between the lower portions of the yoke-arms, and have secured said angle-iron to said yoke-arms by recessing the inner faces of said yoke-arms to receive the upright web 14. The horizontal web 15 of the angle-iron, which will be hereinafter termed the "pedestal tie-bar," lying flat against the bottom of the yoke-arms, and by means of bolts 16 have secured the pedestal tie-bar to the yoke-arms. This construction, as shown in Figs. 3 and 5, effectively ties the yokes or pedestals together and strengthens the arms of the yokes by crossing the space between them. Instead, however, of employing the continuous pedestal tie-bar I can employ the construction shown in Fig. 1, in which the tie-bar 13 extends only between the inner arms 4 of the yokes 2, the inner arms 4 being provided with outwardly-extending lugs 17, to which the web 15 of the tie-bar is secured by the bolts 18, and between the arms 3 4 extend cross-bars 19 on one or both sides, effectively tying them together, bolts 20 securing the cross-bars to the arms, and the bolts 16, which pass through the arms 4, securing the pedestal tie-bar and cross-bar to such arms, making a strong, cheap, and effective structure, allowing of the cross-bars to be removed for the purpose of removing the axle-boxes and wheels from the truck without removing the tie-bar 13.

Hereinafter the side bar 5 and pedestal tie-bar may be referred to as the "upper and

(Here follow diagrams marked pp 103 to 107)

lower chords," respectively, they being so generically designated with other improvements which I have made, wherein the particular structure of truck-frame does not specifically enter as an essential.

Between the upper and lower chords or below the upper chord or upper member of the side frame where no lower chord is used I locate two semi-elliptic springs 21, arched upwardly, banded centrally, as at 22, one spring beneath each of said upper members, which springs are designed to carry and support the car-body, such springs being the main springs of the spring system comprising said elliptics, the springs in the links hereinafter to be described, and others. The semi-elliptic longitudinally-disposed springs not only afford efficient spring-support of the car-body on the truck, but act in a measure as equalizers, distributing the weight equally on the axle-boxes. These springs are supported or hung from the truck-frame, specifically from the side bars 5, such support being such as to allow of a transverse swing of the springs and a longitudinal swing of the supports to allow of the lengthening out of the spring when under compression. These springs are transversely connected rigidly together below the side bars, so that both springs swing in unison with each other and with the center bearing and side bearings. To effect this a flat bar 23 is employed, the ends of which are apertured, as shown at 24, Fig. 5, to form lips, and the bar 23 the springs are securely fixed, as shown at Fig. 5, by two straps 25, which encircle the spring and lie at each side of the central tie-band 22 of the spring, the bar resting on top of the tie-band, each strap being provided with an upwardly-extended end 26, exteriorly screw-threaded and which passes through the bar 23, and an inner and right-angled extension 27, which lies underneath said bar. This bar 23 in itself constitutes a bolster, to which side bearings and a center bearing can be secured in the usual or desired way.

Referring now to the means employed for supporting the semi-elliptic springs from the truck-frame, I can use the form of hangers or links either that shown in Figs. 1 and 2 or those shown in Fig. 3, the form shown in Figs. 1 and 2 being preferred, while those shown in Fig. 3 form the subject-matter of applications filed by me on the 8th day of November, 1897, Serial Nos. 657,969 and 657,970.

The forms shown in Figs. 1 and 2 are extensible links in which a spring is interposed and are constructed substantially as follows: At 28 is a bolt provided with a hemispherical head 29, seated in a like recess 30 in the side bar, the bolt passing through a recess or aperture 31 formed in the bar, widening out as it reaches the under side of the side bar, and forming a conoidal, pyramidal, or triangular aperture in which the bolt can play longitudinally or transversely on its seat in the

side bar, the head and the socket formed for the same by the seat 30 forming a universal joint, permitting unrestricted variation in the movement of the bolt. The bottom portion of the bolt is screw-threaded and carries a movable nut or nuts 32, both for the purpose of forming an efficient seat and to allow of a separation of the parts, and on the nut is a spring-cup 33, and on the spring-cup is a helical or spiral spring 34, which encircles the bolt and extends upwardly toward the side bar, on which spring rests a cap 35, through which the bolt passes. At 36 is a rectangular strap or hanger comprising upright sides 37 and top and bottom cross-bars 38, 39, the top cross-bar being provided with an aperture through which the bolt 28 passes, the bottom cross-bar 38 resting on the cap 35, the semi-elliptic springs resting at their outer ends 40 upon the bottom cross-bar 39 of the strap, and in order to effectively tie the bands of the semi-elliptic springs to the links a lug 41 is formed on the bottom cross-bar 39, a transverse aperture is formed in the cross-bar adjacent to and at the rear of said lug, and the lower leaf of said spring 21 is provided with a downwardly-extending finger or lug 42, which enters said aperture, the end of the spring lying flat on the bottom cross-bar. With this construction the ends of the spring 21 will slide in the strap 36 during the former's extension, but will move the strap and the entire supporting-link longitudinally with it. There are four of these links, two on each side for each one of the springs 21.

Weight placed upon the bolster, thus far indicated by the cross-bar 23, will be primarily taken upon the semi-elliptic springs, from whence transferred to the interposed springs 34 in the links, from whence to the side frames, and finally on the pedestal-springs 10, and ultimately to the axle-boxes. Thus it will be noticed that I employ thus far three sets or series of springs for the support of the car on the truck—those between the axle-boxes and the pedestals, (indicated at 10), the semi-elliptics 21 and the link-springs 34, which support the semi-elliptics from the side frames, which latter I prefer to make of a greater carrying or resisting capacity than those located between the axle-boxes and pedestals.

The location of the semi-elliptic springs outside of the wheel-gage on each side of the truck, together with the location of the links for supporting the semi-elliptics closely adjacent to the axle-boxes, and the swinging of said springs from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck-transoms within the wheel-gage. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the 3d day of November, 1896, Serial No. 610,802, and therefore I do not claim the same herein.

With the before-stated form of suspension

the bolster, thus far illustrated by the cross-bar 23, and the semi-elliptic springs, to which said bolster is rigidly attached, can have a transverse swing all in unison, and for the purpose of enabling a rigid connection between the ends of the semi-elliptic springs and the suspending-links to be had the suspension of the links is of such a character as to swing longitudinally under the influence of the extension of the semi-elliptic springs while under pressure of the load.

The specific form of bolster construction employed herein is not essential, although very desirable.

As will have been previously noted, instead of employing the semi-elliptic springs in their usual position between a spring or sand plank hung from transoms and a bolster I have supported the bolster directly upon the semi-elliptic springs, arranged them longitudinally within the plane of the side frames, and supported the ends of the semi-elliptic springs from the truck-frame by other springs forming part of the truck spring system, thus enabling me to do away entirely with the springs usually interposed between the sand or spring plank and the bolster proper. The cross-bar can therefore be said to be either a spring-plank or a bolster, depending upon the character of its employment. If by choice other springs are supported upon the cross-bar 23—a center bearing or side bearings supported upon the cross-bar by springs—it would specifically be a spring-plank; but when employed in the construction hereinafter described, where the side bearings are spring-supported ultimately on the cross-bar and the center bearing rigidly mounted on the cross-bar, such cross-bar can be correctly termed either a "spring-plank" or a "bolster."

The bolster construction is as follows: Above the cross-bar lies the inverted arch-bar 65, having a central flat portion 66, deflected intermediate sections 67, and horizontal ends 68, resting on the ends of the cross-bar 23, the ends of the arch-bar abutting against the upturned lug 24 of the cross-bar to prevent spreading, and on the top of the arch or flat horizontal portion of the arch-bar is secured a truck center bearing 69 of any desired construction, and between the arch-bar 65 and the cross-bar 23 is interposed a blocking 70, conforming in outline to the space between the cross-bar and the arch-bar, which blocking can be of metal, wood, or any other desired material and constructed as desired.

At 71 are the transoms, formed of angle-iron, the ends of which are received in the lugs or brackets 72, extending inwardly from the side bars 5 on each side, the brackets being recessed, as shown in Fig. 4, to receive the ends of the webs 73 74 of the transoms, the horizontal web 74 lying flush with the top of the bracket and cross-bar, as shown in Figs. 4 and 6, the upright web 73 of the transom being opposed to the side of the bolster and

in alignment with the cross-bar 23, arch-bar 65, and intermediate blocking 70, the ends of the transoms being secured to the upright web 73 of the bracket, thus affording an efficient guide and abutment for the bolster construction.

One of the objects of my invention is to place the car-body low down upon the truck, and thus provide a well-placed center of gravity, which is extremely desirable with the heavy cars and sharp curves in use in city and suburban street traffic, and to secure this end I have suspended the semi-elliptic car-springs within the limits of the side frames and below the upper member thereof and connected said springs transversely by a spring-plank or bolster, as hereinbefore described, below the upper member of said frames, as clearly shown in Figs. 1, 3, 4, and 5, and by means of the arched construction of the bolster elevating the truck center bearing 69 to a sufficient height between the wheels, as clearly shown in Fig. 5, which bearing lies below the top of the wheels, at the same time allowing the truck to swivel easily between the inner sills 76 of the car, as shown in Fig. 6.

In order to bring the side bearings up high enough to engage and support the car-body and to form guides for the springs 21 and bolster on the side bars 5, I have employed the yokes 77, (illustrated in Figs. 7, 8, and 9,) which comprise (preferably in one piece, as a casting of metal) the legs 78 79, from which at the bottom extend flanges 80 81, provided with bolt-holes 82 83, the legs forming a bifurcation united at the top by a head 84, at the top of which is a flat bed 85, having perpendicular sides 86, the legs being provided with intermediate ribbing integrally formed therewith to provide strength, and in the top of the head 84 are formed circular apertures 87, ranged longitudinally of the truck, between which is the central lug or boss 88, and in these apertures or recesses are located short spiral springs 89. (Seen in Figs. 4 and 5.) These springs support a cap 90, which acts as a side bearing, which cap has depending sides 91, embracing the sides of the yoke-head, and forms with the springs a spring-support for the car-body on the bolster, which spring-support must be differentiated from the spring-support provided by the springs interposed between the bolster and spring-plank in the usual constructions. The cap form of plate forms a housing for the protection of the springs in the top of the yokes, and by the irregular form of the cap and the head of the yoke all movement, except up and down, of the plate is prevented.

To prevent movement of the springs interposed between the yokes and the plate, I form lugs 92 on said cap or plate, which depend into the apertures 87 and enter into the springs 89 and confine the springs and cap in position, as clearly shown in Fig. 4, and I preferably form a depression or recess 93 in said

lugs, opening out of the top of said plate, so that such plate can be provided with lubricant or antifriction metal.

The car-body (represented by A) is supported upon the truck center bearing 69 through the medium of the body-bolster 94, which is formed substantially like the truck-bolster, but inverted, the ends of the cross and arch bars 95 96 being bent into L shape, as shown at 97 98 in Fig. 5, to embrace the outer longitudinal sills 100, to which they are securely fastened, a filling 101 being interposed between the cross and arch bars, which may be a separate filling or a part of a cross-sill 102, to which the body rub-plates 103 are secured, the body center bearing 104 being secured to the arch portion of said body-bolster.

The truck and body bolster and their respective center bearings merely provide a swiveling and draft union of the truck with the car, the weight of the car being taken on the side bearings of the truck, the springs interposed between the side bearings and truck-bolster forming a further set of springs additional to those heretofore described for supporting the car, the springs supporting the truck side bearings being comparatively of small resistance or capacity, yieldingly supporting the car-body and allowing of a gentle resistance to the slight movements of the car without affecting to any appreciable degree the other springs in the system and relieving the car-body of the shocks which would be incident to the resistance of said movements were they met by heavier springs of the system.

The side bearing-yokes are further provided with a rearwardly-extending lug 105, having an internal chamber 106, forming the barrel for holding a spiral or other desired form of spring 107, Fig. 5, and the legs 78 79 of the yokes straddle the side bar 5, the space between the legs of the yoke and the side bar on both sides being sufficient to allow considerable transverse swing of the yoke-bolster and semielliptic springs without coming in contact with the side bar, which latter is substantially stationary, except when the axle-boxes are so constructed to bear on their inner sides, in which case they would be under the influence of the thrust of the axles. These "thrust-springs" 107, as they will be termed, impinge against the inner face of the side bar 5, as illustrated clearly in Fig. 5, and yieldingly oppose the transverse swing of the bolster. As the employment of these springs for this purpose is old, I make no claim to the same, except where they may enter into combination with some of the other novel features of improvement recited herein.

By reference to Figs. 2 and 3 it will be seen that the inner flange 81 on the inner leg 79 of the side bearing-yoke 77 is higher than the outer flange and the bottom is inclined at an angle and that the horizontal arms 27 of the straps 28, which embrace the semi-elliptic springs, extend quite some distance in-

wardly. The former is so disposed to allow of the inner leg 79 to rest upon the inclined portion 87 of the arch-bar 65, and the extension of the latter is had for the purpose of bringing an eye formed therein into alignment with the bolt-hole 83 in the flange 81. As before described, the outer upright portions 26 of the straps 28 extend upwardly through the ends of the cross-bar and arch-bar, and they further extend through the bolt-holes 82 in the flange 80 of the yoke, the ends extending above the top of the flange, and, together with a bolt, (shown in dotted lines, Fig. 5,) which extends through the strap extension 27, cross-bar 23, filling 70, arch-bar ends 68, and flange 81 and provided with nuts, firmly secure the semi-elliptic springs to the bolster, and the arch-bar, cross-bar, and yokes together making a firm, compact, and easily dismantled and assembled structure.

As my improvements have special relation to trucks employed in electric propulsion, I have devised a new form of support for a motor thereon.

The motor is conventionally illustrated at 108, one end being sleeved or otherwise suitably supported upon the truck-axle, although this is not essential to my present invention, and the other or free end spring supported from the truck-frame in the following manner:

The front of the motor or its casing is provided with an outwardly-extending lug 109, (shown in Figs. 5 and 6,) which engages with an eye 107, formed in a cross-bar 108 in the usual manner. This cross-bar is formed of a flat bar perpendicularly disposed, the ends of which are twisted or turned at right angles to the plane of the bar to form a spring-seat 109, having an aperture, through which a bolt 110 passes, there being one bolt for each end of the bar. About this bolt and above and below the seat 109 arc spiral springs 111 112, and on the upper spring is a cap 113, confined by a nut 114, the bolt acting as a guide for the springs and a support for the bar.

At 115 are flat bars secured to the side bar 5 at their upper ends and to the pedestal tie-bar 13 at the lower end, as in Figs. 3 and 5, the ends of the bars being turned at an angle to form a spring-seat 116, as clearly shown in Fig. 5. This spring-seat supports the springs 111 112, which in turn supports the cross-bar, and the cross-bar supports the free end of the motor, the springs offering a resilient resistance to the movement of the motor in both directions.

The bolt 110 can pass loosely through the seat 116 or be fixed thereto, a nut 117 being provided at its end in either case.

It will have been observed that many of the features of improvement herein can be modified or altered to suit particular conditions without departing from the spirit of my invention.

Having described my invention I claim—  
1. The combination with the running-gear of a truck, of the side frames located outside

of the truck-wheel gage, transversely-swinging links hung from the side frames, longitudinally-disposed semi-elliptic springs suspended by spring-supported links below the top bar of said frame, a bolster supported on and transversely connecting said springs, and restraining-guides secured to the bolster ends and embracing said top bar, substantially as described.

2. The combination in a car-truck and its running-gear, of the side frames supported outside of the wheel-gage, extensible spring-links depending from the side frames, semi-elliptic springs supported by said links, and a bolster on and transversely connecting said latter springs, substantially as described.

3. The combination in a car-truck and its running-gear, of the side frames supported outside of the wheel-gage, the truck-bolster, longitudinally-disposed semi-elliptic springs hung from the side bars at or near the axle-boxes outside of the wheel-gage by spring-supported links, the bolster resting on and transversely connecting said semi-elliptic springs, and vertically-disposed guides extending between the bolster and side frames, substantially as described.

4. In a car-truck, the combination with means for pivotally securing a car on the truck, of supporting devices for said means, said devices comprising swing-links and longitudinally-disposed semi-elliptic springs connecting said links, the links being extensible in the direction of their length, and springs for opposing the extension of said links, substantially as described.

5. In a car-truck, the combination with car-pivoting devices, said devices comprising transversely-swinging links, semi-elliptic springs connecting the links, said links being extensible in the direction of their length, and an additional spring or springs to oppose such extension, substantially as described.

6. The combination of a truck having a frame, springs supported by said frame, hangers movably supported on said springs, semi-elliptic springs connecting said hangers, and means for supporting a car-body on the truck connected with said semi-elliptic springs, substantially as described.

7. The combination in a car-truck, its running-gear and side frames, of the inflexible bolts 28 movably secured to the side frames at or near the axle-boxes, springs 34 on the bolts, hangers on the springs 34, semi-elliptic springs connected at their ends with the hangers and a bolster supported on said semi-elliptic springs mounted so as to swing in unison with the said bolts and hangers from a point in the side frames, substantially as described.

8. The combination in a car-truck, of the side frames, extensible swing-links having load-supporting springs ranged in the direction of the length of the truck and pendant from the side frames, semi-elliptic springs

ranged in the plane of the side frames and connecting the links, and a bolster supported on said semi-elliptic springs, substantially as described.

9. In a car-truck, the combination with the side frames, a bolster, the semi-elliptic springs supporting the bolster, swing-links supporting said semi-elliptic springs, and a spring in said links, substantially as described.

10. The combination in a car-truck, of the truck-frame, spring-links depending from the truck-frame, semi-elliptic springs connecting the links, and means for connecting said latter springs with a car-body, substantially as described.

11. The combination in a car-truck, of the truck-frame, transversely-swinging spring-links depending from the truck-frame, semi-elliptic springs connecting said links, and a bolster having car-connecting means on said latter springs, said bolster being fixedly secured to said springs and swinging in unison therewith, substantially as described.

12. The combination in a car-truck, of the side frames, with extensible, swinging links carrying springs, said links depending from the side frames, semi-elliptic springs connecting said links, and a bolster secured to said latter springs, substantially as described.

13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.

14. In a car-truck, the combination with the side frames having axle-box pedestals, the longitudinally-disposed semi-elliptic springs, extensible and resilient connections between the ends of the said springs and the side frames at or near said pedestals, and a bolster secured to said springs, substantially as described.

15. In a car-truck, the combination with the side frames having axle-box pedestals, the bolster, longitudinally-disposed resilient supports for the bolster, and resilient connections between the ends of said supports and the side frames, substantially as described.

16. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper and lower chord, links supported from the upper chord by springs, longitudinally-disposed semi-elliptic springs supported between the chords by the said links, a transverse bolster resting on said semi-elliptic springs below the upper chord, and guides between said upper chord and bolster, embracing said chords, substantially as described.

17. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper and lower chord, longitudinally-disposed semi-elliptic springs lying between said chords of each frame, a spring-suspension for the ends of said semi-elliptic springs from the two chords, and a



bolster supported on said latter springs and tying them together transversely, substantially as described.

18. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper and lower chord, semi-elliptic springs disposed between said chords, a swinging and extensible suspension for the ends of said semi-elliptic springs from the upper chord at or near the pedestals, and springs included in said suspension, substantially as described.

19. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster secured to said semi-elliptic springs, links suspended from the side bars and attached to said springs, and further springs carried by said links adapted to oppose the motion of the side frames or the semi-elliptic springs, substantially as described.

20. In a car-truck, the combination of the side frames, the links suspended from the side frames, each link carrying a double-acting spring, semi-elliptic springs secured to said links and a bolster secured to said semi-elliptic springs, substantially as described.

21. The combination in a car-truck of the side frames having axle-box pedestals, springs interposed between the axle-boxes and the pedestals, a bolster, springs hung from the side bars, a resilient support for said bolster on said springs, side bearings and springs for supporting the side bearings on the bolster, substantially as described.

22. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and pedestals, a bolster, springs hung from the side bars, and a resilient support for said bolster on said latter springs, substantially as described.

23. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, a further set of springs supported by the side frames, a bolster supported by said further set of springs, other springs on the bolster, and side bearings supported by the latter springs, substantially as described.

24. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, a further set of springs supported by the side frames, a resilient element supported by said further springs, a bolster on said element, other springs on the bolster, and side bearings on said latter springs, substantially as described.

25. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, a further set of springs supported by the side frames, semi-elliptic springs supported by said further springs, a bolster transversely connecting said semi-elliptic springs, other springs on the bolster, and side bearings

on said latter springs, substantially as described.

26. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, links with interposed springs supported from the side frames, a bolster supported by said link-springs, springs on the bolster and side bearings on said latter springs, substantially as described.

27. The combination in a car-truck, of the side frames having axle-box pedestals, spiral springs interposed between the axle-boxes and said pedestals, a set of spiral springs of greater carrying capacity supported from the side bars, semi-elliptic springs connecting said latter springs, and a bolster on said semi-elliptics, substantially as described.

28. The combination in a car-truck, of the side frames having axle-box pedestals, spiral springs interposed between the axle-boxes and said pedestals, spiral springs of greater carrying capacity supported from the side bars, a resilient equalizing connection between said latter spiral springs, a bolster on said connection, springs on the bolster, and side bearings on said springs, substantially as described.

29. The combination in a car-truck, of the side frames having axle-box pedestals, spiral springs interposed between the axle-boxes and said pedestals, spiral springs of greater carrying capacity supported from the side bars, semi-elliptic springs supported by said latter springs, a bolster on said semi-elliptics, springs on the bolster, and side bearings on said springs, substantially as described.

30. In a car-truck, the combination with the side frames, of the longitudinal leaf-springs, a bolster tying said springs together, links pendent from the truck-frame and adapted to move perpendicularly relatively to said frame, the ends of said springs resting on said links, and further springs adapted to resist the downward movement of the links, substantially as described.

31. In a car-truck, the combination with a truck-frame having upper and lower chords on each side, upwardly-arched semi-elliptic springs disposed below the upper chords, a cross-bolster secured to the arch of said springs below the upper chord, spiral springs deriving their support from the upper chords, and a perpendicularly-movable connection between spiral springs and the ends of the semi-elliptics, substantially as described.

32. A truck having a frame, a car-body and means for supporting the body on the truck, comprising longitudinal semi-elliptic springs, links extending between the ends of the semi-elliptic springs and the truck-frame, and spiral springs adapted to coact with the semi-elliptic springs in supporting the car-body, substantially as described.

33. A truck having a frame, a car-body, combined with means for upholding the body

on the truck, comprising semi-elliptic springs, spiral springs, adapted to coact with the ends of the semi-elliptics, and connections between the ends of said semi-elliptics and the truck-frame, substantially as described.

34. The combination in a car-truck, of the side frames, transversely-swinging links pendent from the side frames, horizontal semi-elliptic springs suspended by said links, a bolster on said springs, guides extending between said bolster and frames, and springs between said guides and said frames, substantially as described.

35. The combination in a car-truck, of the side frames, the pendent swing-links, springs supported on the links, horizontal semi-elliptic springs suspended by said links and springs, and a bolster on said elliptic springs, substantially as described.

36. The combination, in a car-truck, of the side frames, the pendent links hung to swing in the direction of the length of the side frames, springs on the links, horizontal semi-elliptic springs supported by said link-springs, a bolster on said semi-elliptics, and guides between the bolster and side frames, substantially as described.

37. The combination in a car-truck, of the side frames, the pendent swing-links, springs supported on the links, horizontal semi-elliptic springs suspended by said link-springs, and a bolster transversely connecting and resting on said semi-elliptics, substantially as described.

38. The combination, in a car-truck, of the side frames, the pendent swing-links, springs supported on the links, horizontal semi-elliptic springs suspended by said link-springs, a bolster transversely connecting and resting on said semi-elliptics, springs on the bolster, and side bearings on said springs, substantially as described.

39. The combination in a car-truck, of the side frames, the transversely-swinging pendent links, said links being extensible in the direction of their length, springs on said links, horizontally-disposed semi-elliptic springs connecting said links and resting on the link-springs, and a cross-bolster rigidly secured to said semi-elliptics, the semi-elliptics, the links and bolster swinging bodily together, substantially as described.

40. The combination in a car-truck, of the side frames, the transversely-swinging links depending below the upper element of the side frames, the semi-elliptic springs disposed below said upper element and connected at their ends with said links, a bolster secured to said springs below the said element, guides extending between said element and the bolster and springs interposed between said guides and said element, substantially as described.

41. The combination, in a car-truck, of the side frames having upper and lower chords, the transversely-swinging links depending below the upper chord of each of the side frames,

the semi-elliptic springs disposed below said upper chord on each side and connected at their ends with said links, a bolster secured to said springs below said chord, a yoke on each end of said bolster embracing said chord, and a thrust-spring between each of said yokes and said chord, substantially as described.

42. The combination in a car-truck, of the side frames, the transversely-swinging links having interposed springs depending below the upper element of each of the frames, the semi-elliptic springs disposed below the said element on each side and connected at their ends with said links, a bolster secured to said springs below said element, a yoke on each end of the bolster embracing each of said elements, a spring on the yokes, and side bearings on the springs, substantially as described.

43. The combination in a car-truck, of the side frames, extensible links, each with an interposed spring hung on the side frames, semi-elliptic springs suspended by said link-springs, and a bolster supported by said semi-elliptics, substantially as described.

44. The combination in a car-truck, of the side frames, the pendent, transversely-swinging links suspended from the side frames, semi-elliptic springs connecting said links, a bolster on said springs, yokes on the bolster embracing the side frames, and further springs in the yokes bearing against the side frames, substantially as described.

45. The combination in a car-truck, of the side frames, hangers pivotally suspended from said frames, each of said hangers having a bolt, a follower on the bolt, a spring interposed between the hanger and follower, semi-elliptic springs secured at their ends to said hangers, and a bolster on said semi-elliptic springs, substantially as described.

46. The combination in a car-truck, of the side frames, swing-links hung from the side frames, the horizontal semi-elliptic springs suspended by the links, a bolster secured on said springs, yokes on the ends of the bolster embracing a part of each of said frames, springs on the yokes, and side bearings on the springs, substantially as described.

47. The combination in a car-truck, of the side frames having upper and lower chords, horizontal semi-elliptic springs suspended from the upper chords, a bolster secured to said springs below the upper chords, yokes embracing the upper chords and secured to the ends of the bolster, springs on the yokes, and side bearings on the springs, substantially as described.

48. The combination in a car-truck, of the side frames, the horizontal semi-elliptic springs suspended from the side frames, a bolster secured on said springs, yokes on the bolster embracing a part of each of said frames, a spring on each of the yokes, and side bearings on the springs, substantially as described.

49. The combination in a car-truck of the

side bars, horizontal semi-elliptic springs suspended from and below the side bars, a bolster secured to said springs below the side bars, a yoke on each end of the bolster and embracing the side bars, a spring on each yoke, a center bearing on the bolster extending above the side bars, and a bearing on the yoke-springs, substantially as described.

50. The combination in a car-truck, of the side bars, the semi-elliptic springs suspended by and below the side bars, a yoke supported by each of the springs and straddling the side bar and extending above it, springs on the yokes, and side bearings on the yokes above the side bar, substantially as described.

51. In a car-truck, the combination of the side bars spring-supported on the axle-boxes, the semi-elliptic springs suspended from the side bars, a cross-bar uniting the latter springs below the side bars, the yokes on the semi-elliptic springs embracing the side bars, and side bearings on the yokes, substantially as described.

52. In a car-truck, the combination with the side bars, links depending from the side bars, a ball-and-socket connection between the links and side bars, semi-elliptic springs connecting the links, and a bolster on said semi-elliptics, substantially as described.

53. In a car-truck, the combination with the side bars and bolster, of links included in a support for the bolster on the side bars, said links having a ball-head, a conical aperture formed in the side bar for said links, and a seat for the link-head in said aperture, substantially as described.

54. In a car-truck, the combination with the side bars and bolster, of the bolts depending from the side bars, a spring on each of the bolts, a strap movable on each of the bolts and resting on the spring, and connections between the straps and said bolster, substantially as described.

55. In a car-truck, the combination with the side bars, of the bolts depending from the side bars, a spring on each of the bolts, a strap movable on each of the bolts and resting on the spring, semi-elliptic springs, the ends of which rest on said straps and a bolster on said semi-elliptic springs, substantially as described.

56. The combination in a car-truck, of the side bars, the depending bolt, the spring-seat on the bolt, a spring on the seat encircling the bolt, a rectangular strap resting on said spring, the bolt passing through said strap, and a bolster supported on said strap through an intermediate connection substantially as described.

57. The combination in a car-truck, of the side bars, a depending bolt, a head on the bolt engaging the side bar, a detachable nut on the lower end of the bolt, a rectangular apertured strap, the bolt passing through said aperture, a spring about the bolt resting on said nut and supporting said strap, and a bolster supported on said strap through an

intermediate connection, substantially as described.

58. The combination with the side bar of the bolt depending therefrom, a head on the bolt engaging the side bar, a seat on the bolt, a spring on the seat, a strap resting on said spring and engaging the bolt, a seat on the strap consisting of the cross-bar 39 having a transverse aperture, and a leaf-spring resting on the cross-bar, said leaf-spring having a lug on the end lying in said aperture, substantially as described.

59. The combination with the side bars, of the semi-elliptic springs supported thereon, a transverse bar resting on said springs, the flanged yokes on the bar embracing the side bars, and a strap secured to the ends of said bar and to the yoke-flanges and embracing said springs, substantially as described.

60. The combination with the side bars, of the semi-elliptic springs supported thereon, a tie-band about the center of the springs, a transverse bar resting on said band, the flanged yokes on the bar embracing the side bars, and U-shaped straps secured to the ends of said bar and to the flanges and embracing the said springs, substantially as described.

61. The combination with the side bars, of the longitudinally-disposed semi-elliptic springs suspended therefrom, a transverse bar resting on said springs below the side bars, the flanged yokes resting on the bar and embracing the side bars, straps connecting the yoke-flanges, transverse bars and springs, side bearings supported by said yokes, and a center bearing on said transverse bar, substantially as described.

62. The combination with the side bars, of the longitudinally-disposed semi-elliptic springs, straps at the ends of said springs, a bolt depending from the side bars and guiding the strap, and a spring on the bolt supporting the strap, substantially as described.

63. The combination with the side bars, of the longitudinally-disposed semi-elliptic springs, straps at the ends of each of the said springs, a bolt for each of said straps movably hung from the side bars, the strap being adapted to move up and down on the bolt as a guide, a spring on each of the bolts supporting the straps, and a cross-bolster transversely connecting said semi-elliptic springs, substantially as described.

64. The combination with the side bars, of the longitudinally-disposed semi-elliptic springs, rectangular straps engaging the ends of each of said springs, a bolt for each of said straps depending from the side bars and extending into said strap, a seat on each of the bolts, a spring on each of the bolts extending between the seat and the top of said strap, and a cross-bolster transversely connecting said semi-elliptic springs, substantially as described.

65. The combination with the side bar, of the conical apertures formed in and extending through the side bars, bolts movably en-

pended from the side bars and passing through the apertures, the seat on the bolt, a rectangular strap having a top cross-bar in line with the side bar, an aperture formed in the said cross-bar through which the said bolt passes, and a spring extending between the seat and said top cross-bar, substantially as described.

66. The combination with the side bars, of the longitudinal semi-elliptic springs suspended therefrom, a transverse plank connecting said springs below the side bars, a bar with a central elevation on said plank, transoms secured to said side bars longitudinally in line with said bar, yokes on said bar, springs on the yokes, side bearings on the springs, and a center bearing on said elevation, substantially as described.

67. In a car-truck, the combination with the side bars and a bolster, of the upwardly-extending bifurcated castings on the bolster, said castings straddling the side bars and having a solid head above the side bars, springs in separated recesses in said head, and a bearing-plate having depending lugs, the plate resting on the springs and the lugs entering the springs, substantially as described.

68. The combination with the casting having separated recesses formed in the top thereof, a coiled spring in each of said recesses, a plate on said spring, and lugs depending from said plate into said recesses and into the coil of each of the springs, substantially as described.

69. The combination with the casting having a recess in its top, a spring in the recess, a flush-top bearing-plate on said spring, a lug depending from said plate and extending into said spring, and a recess in said lug opening out of the plate, substantially as described.

70. The combination with the side bars, of the cross-bar supported by the side bars, the yokes secured to said bar and straddling the side bars, and a spring interposed between each of the side bars and the inner members of each of the yokes, substantially as described.

71. The combination with the side bars, of the cross-bar supported by the side bars, the yokes secured to said bar and straddling the side bars, a barrel extending from the inner members of each of the yokes, and a spring in each of the barrels engaging the side bars, substantially as described.

72. In a car-truck, the combination of the cross-bar, the leaf-springs below the cross-bar, the bearing-yokes above the cross-bar, flanges on each of the yokes, straps passing through said flanges and cross-bar and embracing said springs, and nuts on the ends of the straps resting on said flanges, substantially as described.

73. In a car-truck, the combination of the cross-bar, the leaf-springs below the cross-bar, the arch-bar resting at its ends on the cross-bar, the bearing-yokes on the arch-bar, flanges on the yokes, straps passing through said flanges, cross and arch bars and embracing

said springs, and nuts on the ends of the straps resting on said flanges, substantially as described.

74. In a bolster, the combination with the horizontal cross-bar 23, of the superposed arched bar having intermediate portions 67 converging to the cross-bar, and horizontal ends resting on the cross-bar, a central arched block having wedge-shaped ends interposed between the cross and arched bars, elevated castings on the horizontal ends, side bearings on the castings, means for supporting the bolster, and a center bearing on the arch, substantially as described.

75. In a body-bolster, the combination with the car-sills of the flat cross-bar 95 having ends bent down and outward to engage the side and bottom of each of the sills 100, the inverted arch-bar 96 having ends 97, 98 likewise disposed on the ends of the cross-bar 95, an inverted arch-block having wedge-shaped ends interposed between the cross and arch bars, and a body-bearing secured to said arch, substantially as described.

76. In a motor-support, the combination with the upper and lower chord of the side frames, of the hangers secured to the upper and lower chords of each side frame, seats extending inwardly from the lower ends of said hangers, bolts on the seats, springs on each of the seats, and a cross-bar interposed between the springs on each of the seats, substantially as described.

77. The combination with the depending arms of the axle-box yokes, of the pedestal tie-bar of angle-iron, the vertical web of which is secured in a recess in each of said arms, the horizontal web extending under the arms, substantially as described.

78. In a car-truck, the combination with the side bars of the truck-frame, of longitudinally-disposed semi-elliptic springs supported by the side bars, a bottom cross-beam resting on and extending between said springs below the side bars, a top cross-beam having a central elevation for supporting a center bearing and horizontal ends resting on the ends of the bottom cross-beam below the side frames, straps securing the springs and beams together, and transoms extending between the side bars for guiding the top beams, substantially as described.

79. In a car-truck, the combination with the side frames having axle-box pedestals, longitudinal semi-elliptic springs disposed below the top bar of the side frames, links having enlarged heads depending from the top bars at or adjacent to said pedestals and providing a universal joint for the support of said springs within the top bars, and a cross-beam tying said springs together below the top bars, substantially as described.

80. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster secured to said semi-elliptic springs, links suspended from the side bars and attached to said springs, and further springs

combined with said links adapted to oppose the motion of the side frames or the semi-elliptic springs, substantially as described.

81. The combination, in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described.

82. The combination in a car-truck, of the side frames, springs suspended from the side frames, resilient members suspended by said springs, and a cross-bolster resting on said members, substantially as described.

83. The combination with the side frames of a car-truck, of the jointed links depending from the side frames, semi-elliptic springs secured to the ends of the links and suspended from the side frames, further springs included in said suspension, and a cross-bolster connecting the semi-elliptic springs, substantially as described.

84. The combination with the side frames, of the longitudinal semi-elliptic springs, jointed links secured to the ends of the semi-elliptic springs and hung from the side frames, spiral springs surrounding the links and providing a resilient support for the semi-elliptic springs through the links from the side frames, and a bolster connecting the said semi-elliptic springs, substantially as described.

85. The combination in a car-truck, of the side frames, springs supported by the said frames, links suspended from the side frames and combined with said springs, a bolster, a resilient support for said bolster on said springs, side bearings, and springs supporting the side bearings on the bolster, substantially as described.

86. The combination in a car-truck, of the side frames, spiral springs supported by the side frames, jointed links suspended from the side frames and combined with said springs, a bolster, leaf-springs supporting said bolster on said spiral springs, side bearings, and spiral springs supporting the side bearings on the bolster, substantially as described.

87. In a car-truck, the combination with the side frames of a car-body-supporting bolster, pivotal supports for the bolster depending from the truck-frame, a resilient element directly secured to the bolster and springs for supporting said resilient element through said pivotal supports, substantially as described.

88. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and pivotal links, said links comprising a plurality of sections movably secured together, and further springs combined with said links to elastically suspend the said semi-elliptic springs from the side frames, substantially as described.

89. In a car-truck, the combination with the

side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and pivotal links, said links comprising a plurality of sections movably secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from said side frames, substantially as described.

90. In a car-truck, the combination with the side frames, each comprising two pedestals and upper and lower beams, of a car-body-supporting bolster, a plurality of half-elliptic springs arranged between the upper and lower longitudinal beams of the frames and connected to the ends of the bolster and link appliances connected to the ends of said half-elliptic springs, and flexibly supported at their upper ends on said upper beams, substantially as described.

91. The combination in a car-truck, of side frames, comprising pedestals, upper and lower side beams connecting the pedestals, axle-boxes in the pedestals, a bolster, half-elliptic springs arranged between the upper and lower side beams and supporting the bolster, links, and spring-supports therefor suspended from the upper beams and supporting the half-elliptic springs between the upper and lower beams, substantially as described.

92. The combination, in a car-truck, of side frames, each comprising upper and lower longitudinal beams and pedestals, half-elliptic springs arranged between the upper and lower beams, a bolster supported thereby, the ends of the half-elliptic springs being supported from the upper beams by spring-equipped appliances, substantially as described.

93. The combination in a car-truck of the side frames, each comprising upper and lower beams and pedestals, of half-elliptic springs arranged beneath the upper side beams, a bolster supported by said half-elliptic springs and appliances connected to the ends of said half-elliptic springs, and supporting them from the side frames, and spiral springs connecting with said appliances, by which the half-elliptic springs are suspended, substantially as described.

94. The combination in a car-truck, of side frames, each comprising upper and lower longitudinal beams and pedestals, with half-elliptic springs arranged between the upper and lower longitudinal beams, a car-body-supporting bolster supported by said half-elliptic springs and adapted to carry the weight of the car-body at its center, the ends of said half-elliptic springs being suspended from the upper longitudinal beams by spring-equipped appliances, substantially as described.

95. The combination, in a car-truck, of the side frames, comprising pedestals, upper beams and lower beams between the pedestals, axle-boxes in the pedestals, springs between the axle-boxes and the tops of the pedestals, a bolster, half-elliptic springs which support the bolster, and spring-supporting

links which pass through the upper beams and are supported from their upper edges, substantially as described.

96. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam of a car-body-supporting bolster, half-elliptic springs supporting said bolster and located between said upper and lower longitudinal beams of the respective side frames, and appliances for suspending said springs between the upper longitudinal beams and the lower longitudinal beam, substantially as described.

97. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a car-body-supporting bolster, half-elliptic springs located between said upper and lower longitudinal beams and supporting the bolster, and link appliances secured to the ends of said springs and movably suspended between the sides of said upper longitudinal beams, substantially as described.

98. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a car-body-supporting bolster, half-elliptic springs connected to the ends of said bolster and supporting the same, and elastic link appliances secured to the ends of said springs and suspended from within the upper longitudinal beams, substantially as described.

99. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a car-body-supporting bolster, half-elliptic springs upon which the ends of said bolster rest, and links suspended from within the upper longitudinal beams and supporting the ends of said springs for the purpose of permitting lateral displacement of said springs with relation to the side frames, substantially as described.

100. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower beam interposed between the pedestals, of a car-body-supporting bolster, and spring-actuated appliances on which the ends of the bolster directly rest for sustaining said bolster inserted between said beams and suspended from within said interposed upper beams, substantially as described.

101. In a car-truck, the combination with the side frames, each comprising two pedestals, and a longitudinal beam interposed between the same, of a car-body-supporting bolster, half-elliptic springs upon which the ends of said bolster rest, and suspending appliances for the ends of said springs inserted between the sides of one of the beams of the side frames, substantially as described.

102. In a car-truck, the combination with the side frames, of a car-body-supporting bolster elastically suspended from the upper

beams of said side frames by appliances which pass between the sides of the said beams and which permit said bolster to move longitudinally and transversely with reference to the side frames, substantially as described.

103. In a car-truck, the combination with the side frames, of a car-body-supporting bolster, bolster-supporting spring-supports supported from the side frames to permit the bolster to move vertically and appliances suspended from the upper beams of the side frames and sustaining the spring-supports for the bolster and permitting the latter to move transversely and longitudinally with reference to the side frames, substantially as described.

104. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a pair of transoms arranged transversely of the truck-frame and secured to the upper longitudinal beams, a car-body-supporting bolster arranged to operate between said transoms, half-elliptic springs supporting said bolster and located between the upper and lower longitudinal beams at each side of the truck-frame, and suspending appliances connected to the ends of said half-elliptic springs and to the upper longitudinal beams and constructed to swing longitudinally as well as transversely of the truck, substantially as described.

105. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a car-body-supporting bolster, a plurality of half-elliptic springs arranged between the upper and lower longitudinal beams of the side frames and connected to the ends of the bolster by suitable yokes, link appliances connected to the ends of said springs and flexibly supported at their upper ends between the sides of the upper longitudinal beams and adapted to have motion longitudinally as well as transversely of the truck, substantially as described.

106. In a car-truck, the combination with the side frames, including upper and lower longitudinal beams, of half-elliptic springs suspended between said upper and lower beams, and a car-body-supporting bolster consisting of a flat bar secured to aforesaid half-elliptic springs and link appliances connected to the ends of said springs and suspended from the upper longitudinal beams of the side frames, substantially as described.

107. In a car-truck, the combination with the side frames, each comprising two pedestals, an upper beam and a lower longitudinal beam, of a car-body-supporting bolster, half-elliptic springs supporting said bolster and located between said upper and lower longitudinal beams of the respective side frames, appliances for suspending the half-elliptic springs between said upper and lower longitudinal beams, journal-boxes operating within the pedestals, and spiral springs located

directly over the journal-boxes within the pedestals, substantially as described.

108. The combination, in a car-truck, of the side frames, comprising pedestals, upper and lower beams between the pedestals, a bolster with a center bearing, the ends of the bolster extending below the upper beams, half-elliptic springs between the upper and lower beams and to which the bolster ends are secured, and spring devices supported from the upper beams and supporting the ends of the half-elliptic springs, substantially as described.

109. The combination, in a car-truck, of the side frames, comprising pedestals, upper beams and lower beams between the pedestals, a bolster with a center bearing and having ends inclined down and terminating in horizontal parts below the upper beams, half-elliptic springs between the side beams and to which the horizontal parts are secured, and spring devices supported from the upper beams supporting the ends of the half-elliptic springs, substantially as described.

110. In a car-truck, the combination with the side frames each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam, of a car-body-supporting bolster, half-elliptic springs upon which the ends of said bolster rest, and universal link appliances secured to the ends of said springs and suspended from between the sides of the upper longitudinal beam, substantially as described.

111. In a car-truck, the combination with the side frames, of a car-body-supporting bolster, half-elliptic springs upon which the ends of said bolster rest, and universal links suspended from a point within the side frames and supporting the ends of said half-elliptic springs, substantially as described.

Signed in the city and county of Philadelphia, State of Pennsylvania, this 20th day of January, 1897.

GEORGE M. BRILL.

Witnesses:

R. S. REED,  
R. W. BROODRENT.



G. M. BRILL.  
CAR TRUCK.

(Application filed Nov. 9, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

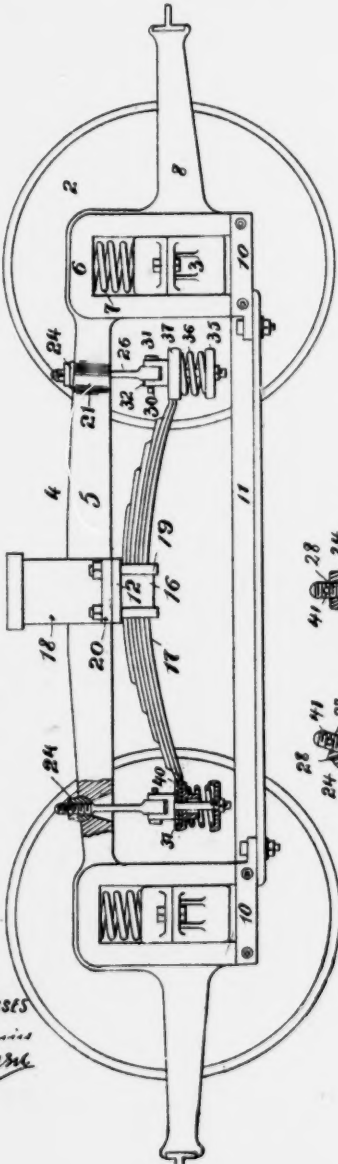


Fig. 4.

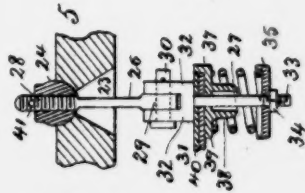
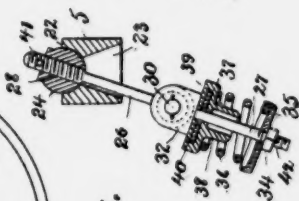


Fig. 3.



WITNESSES

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No. 627,900.

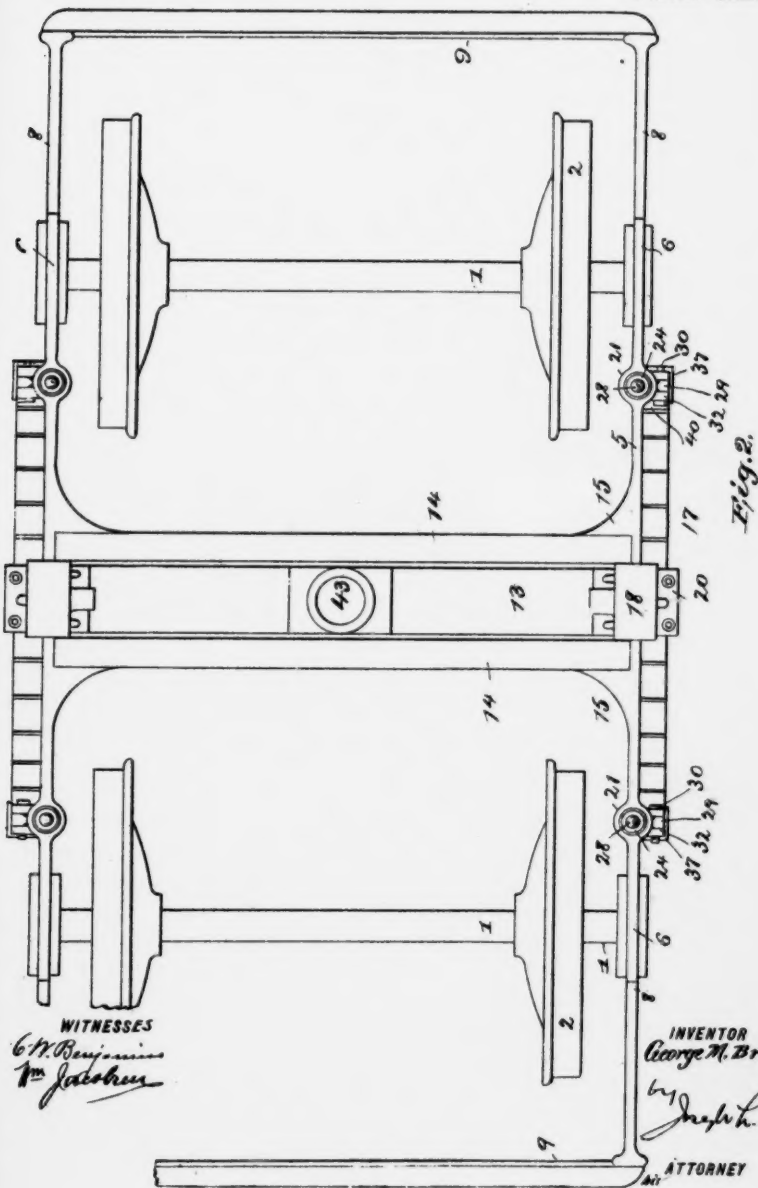
Patented June 27, 1899.

G. M. BRILL.  
CAR TRUCK.

(Application filed Nov. 9, 1897.)

(No Model.)

2 Sheets—Sheet 2.



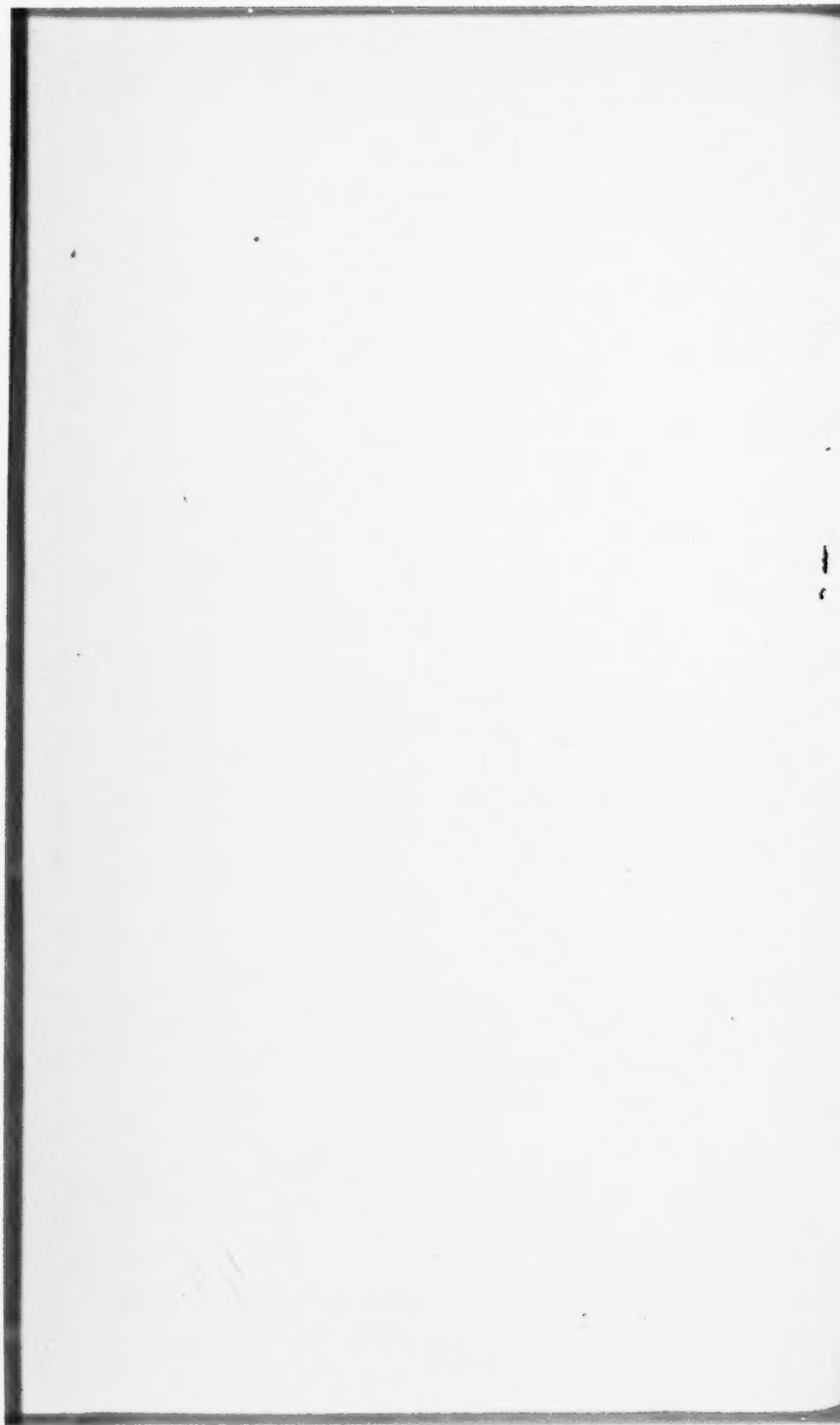
WITNESSES

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ATTORNEY



# UNITED STATES PATENT OFFICE.

GEORGE MARTIN BRILL, OF PHILADELPHIA, PENNSYLVANIA.

## CAR-TRUCK.

**SPECIFICATION** forming part of Letters Patent No. 637,900, dated June 27, 1899.

Original application filed July 3, 1897, serial No. 643,339. Divided and this application filed November 9, 1897. Serial No. 887,970. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE MARTIN BRILL, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have made certain new and useful Improvements in Car-Trucks, of which the following is a specification.

My invention relates to improvements in car-trucks generally, and especially to trucks employed in passenger service in connection with electric propulsion; and the subject-matter of this present application relates to that forming part of an application filed by me on the 3d day of July, 1897, Serial No. 643,339, of which this application is a division.

In the above-stated application, among other things, is recited means for suspending the truck-bolster, comprising two longitudinally-disposed semi-elliptic springs arched upwardly, the ends of the springs being hung from the side frame by links, which links carry springs cooperating with the links in supporting the semi-elliptic springs from the side frames.

My present improvements relate to the construction of the links for supporting the semi-elliptic springs from the truck-frame.

My invention therefore consists in the construction and combination of parts hereinafter described, and further pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a car-truck embodying my improvements; Fig. 2, a plan view thereof; Fig. 3, a transverse sectional elevation, enlarged, through a portion of the side bar of the truck-frame and the link, showing the splayed position of the link while in use; Fig. 4, an enlarged longitudinal sectional elevation of a portion of the truck side frame and the suspending-link.

Similar numerals of reference indicate corresponding parts throughout the several views.

The truck and its associated parts, with the exception of the links, as hereinafter described and claimed, form no part of my present invention, and therefore any suitable form of truck can be employed without departing from the spirit thereof. The one here illus-

trated, to which my invention has been employed, comprises the axles 1, wheels 2, axle-boxes 3, and a truck-frame comprising side frames 4, made up of the side bars 5, inverted-U-shaped axle-box yokes or pedestals 6, between which and the axle-boxes 3 extend axle-box springs 7, the outer legs of the yokes being provided with extensions 8, tied transversely together by an angle-iron cross-bar 9, seated in a recess in the end of said extensions, the legs or arms of the yokes being braced by a cross-bar 10 and by an intermediate pedestal tie-bar 11, secured to the inner yoke-arms.

The bolster consists of a cross-bar 12, extending transversely of the truck and lying under the side bars 5, and an inverted arch-bar 13, lying between transoms 14, extending between brackets 15, formed on the inner side of the bars 5, the cross-bar 12 of the arch-bar resting on a central strap 16, secured to the semi-elliptic springs 17, which latter extend in the same planes as the side bars and lie below them, the end of the cross-bar carrying an upwardly-extending bifurcated yoke 18, forming a support for the side bearings of the truck, the yoke 18, cross-bar 12, and springs 17 being secured together by straps 19, passing around the band 16 and through the ends of the bar 12 and flanges 20 at the bottom of the yokes 18.

The foregoing describes a truck illustrated in connection with my invention recited in the foregoing application, to which cross-reference is hereby made for more specific details.

The object of my present invention is to provide efficient means for supporting the semi-elliptic springs, which in their turn support the bolster from the side bars of the truck-frame, the bolster tying the springs on each side of the truck together, so that they can move transversely and longitudinally in unison one with the other, the superposed yoke 18 embracing the side bar 5 to limit the swing of the bolster and to form, with the side bar, guides for the up-and-down movement of the bolster.

The means for supporting the semi-elliptic springs from the side frames of the truck,

Here follow diagram marked p. 119 & 120

which is the subject-matter of my present invention, will now be described.

It is one of the objects of the invention recited in the before-mentioned application to extend the spring-base or resilient support for the bolster as close to the axle-box pedestals as convenient in order to provide a more thorough support for the car on the truck than is had where the spring-support is centered about the bolster in the usual form of truck.

I form links or hangers for the semi-elliptic springs as follows, which construction involves the employment of an articulated supporting-link having a universal or ball-and-socket connection with the side bar and supporting a compressible or link spring. Adjacent the yokes or pedestals a perpendicularly-disposed aperture is formed in enlargements 21 in the side bars, the aperture comprising a circular depression or socket 22 and a conical opening 23 therefrom leading out from the bottom of the side bar. The depression 22 forms (with the device hereinafter described) one element of the ball-and-socket joint, the other element consisting of the semispherical head or ball 24, seated in the recess or socket 22 in the side bar and extending into the aperture 23 in the side bar, thus forming a ball-and-socket connection with the side bar for the depending link 25.

The link embodies the upper and lower bolts 26 27, the upper bolt or link-section being provided with an exterior screw-threaded enlargement 28, on which the ball 24 is movable, thus forming an adjustable member for the link and providing a ball-and-socket connection between the bolt 26 and the side bar, the bolt 26 passing through the aperture 23, the head or bolt 24 being movable on or detachable from the bolt 26 in order to allow adjustment for wear and assembling parts. The lower end of the bolt 26 is provided with an enlargement or eye 29, through which extends a pin 30, lying longitudinally. The upper end of the lower bolt 27 is in the form of an eyebolt and is provided with a bifurcated knuckle 31, formed by the parallel arms 32, which embrace the eye 29, the arms being pierced by the pin 30, thus pivotally securing the upper and lower link-sections together and allowing, as illustrated in Fig. 3, of the transverse swing of the lower section of the link without inclining it in relation to the upper link-section, the upper section of the link taking the inclination on its ball-and-socket connection with the side bar. The lower portion of the bolt 27 is exteriorly threaded at 33 and provided with a movable nut 34, and on this nut is seated a cup 35, on which cup rests spiral springs 36, which springs support a casting 37, apertured to allow of the bolt 27 passing therethrough, the casting having a depending lug 38 entering into the interposed spring 36, and on top of the casting or cap 37 is provided the seat 39 for the ends 40 of the leaves on the semi-elliptic springs

17, through which the lower bolt 27 passes, said leaves abutting against the bottom of the knuckle 31, which latter acts as a stop to limit the upward movement of the spiral springs 36. Safety cotter-pins 41 42 can be employed in the usual way.

In this way a ball-and-socket or universal supporting-link is had from the side bar, which link is articulated to allow of a bodily transverse swing of the lower portion of the link perpendicularly (to a certain extent) to the side bar, which link suspension also embodies the interposed link-springs for supporting the semi-elliptic springs on the links, allowing the bolster and semi-elliptic springs to swing transversely of the truck in unison, and at the same time allowing of a slight longitudinal movement of the bolster and springs and links, the latter being limited only by the transoms, as shown in Fig. 2.

The springs (on the links) besides resiliently supporting the semi-elliptic springs offer a resilient check to the upward movement of one end of the truck during the application of the brake-shoes to the ca.-wheels and otherwise materially modifying the action of the truck and car in relation to each other.

The spread of the bolster across the truck is preferably had to such an extent that the links are slightly splayed outwardly, as illustrated in Fig. 2, in order to afford a firm base of support for the bolster and prevent the links swinging over their normal center to too great an extent.

Having described my invention, I claim—

1. The combination in a car-truck, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported on said springs, links depending from the side frames of the truck, said links being articulated between their ends, a spring on each of the lower members of said links, the ends of the semi-elliptic springs resting on said latter springs, substantially as described.

2. The combination in a car-truck, of the side frames, links pendent from the side frames, said links comprising a ball-and-socket connection with the side frame, and an articulation intermediate of their ends, a spring supported on the member of said links below the articulation, semi-elliptic springs longitudinally disposed below the side bars, the ends of said springs resting on the link-springs, and a bolster secured to said semi-elliptic springs and tying them together transversely, substantially as described.

3. In a car-truck the combination with the side bar, of the bolt articulated between its ends, a seat on the lower member, a spring on the said seat, a cap on said spring, and another spring on said cap, substantially as described.

4. In a car-truck the combination with the side bar, of the upper link-bolt suspended from the side bar, the lower link-bolt movably connected with the upper link, a nut on the lower link, a seat on the nut, and spring

on the seat about the bolt, a seat on the spring, and a leaf-spring on the latter seat, substantially as described.

5 In a car-truck the combination with the side bar, of the upper link-bolt suspended from said bar, an eye on the bolt and a pin passing through the eye, the lower link-bolt, a knuckle thereon engaging the pin in the upper bolt, a nut on the lower bolt, a seat on the nut, a spring on the seat, a recessed seat on said spring below said knuckle, and a leaf-spring in said recess, substantially as described.

6. The combination with the side frames 15 of the car-truck, of the links pendant therefrom, a bolster supported by said links, an aperture in the side bar, a ball movable in said aperture, the upper ends of said links being exteriorly screw-threaded, and an interiorly-threaded aperture in said ball to receive the threaded end of said links, substantially as described.

7. In a car-truck, the combination with the side frames, of a bolster, articulated links, 25 pivotally suspended from the side frames, springs on the links, and a connection extending between the links resting on said springs and supporting the bolster, substantially as described.

30 8. In a car-truck, the combination with the side frames, of links articulated between their ends and pivotally suspended from the side frames, springs on said links below the articulation, a connection extending between 35 the links and resting on said springs at a point below said articulation, and a cross-bolster resting on said connection, substantially as described.

9. In a car-truck, the combination with the 40 side frames, of links articulated between their ends and pivotally suspended from the side frames, spiral springs about the lower element of said links, cups on the lower element supporting said springs, a longitudinal connection extending between the links guided 45 by said lower element, and resting on said springs, and a bolster resting on said connection, substantially as described.

10. In a car-truck, the combination with the 50 side frames, of the two-part links depending in pairs from the side frames, said links comprising a lower element having a bifurcated enlargement at the upper end and a cup secured at the lower end, and an upper element 55 pivotally secured to the side frame at the upper end and in the bifurcation at the lower end, spiral springs about the lower element resting on said cup, a connection extending between the links and loosely engaging the lower element between the top of said spring 60 and the bottom of the enlargement, and a bolster resting on said connections, substantially as described.

11. In a car-truck, the combination with the 65 side frames, of the upper link-bolts pivoted to said frames, lower link-bolts having eyes to which the upper bolts are pivoted, connections

through which the lower bolts extend, springs on the lower bolts, below said connections, whereby the connections are elastically supported, and a car-supporting bolster on said connections, substantially as described. 70

12. In a car-truck, the combination with the side frames, of the upper link-bolts pivoted 75 to said frames, lower bolts having eyes to which the upper bolts are pivoted, connections through which the lower bolts extend, spiral springs on the lower bolts below said connections, cups against which the spiral 80 springs press, and a car-supporting bolster suitably supported on said connections, substantially as described.

13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being 85 pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further 90 springs included in the link suspension of said semi-elliptic springs, substantially as described.

14. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs 95 and pivotal links, said links comprising a plurality of sections pivotally secured together, and further springs combined with said links to elastically suspend said semi-elliptic 100 springs from the side frames, substantially as described.

15. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs 105 and articulated and pivotal links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from the 110 side frames, substantially as described.

16. The combination with the side bar having a conical opening therein, a bolt, a thread formed on the bolt, a ball on the bolt engaging the thread, a seat in the opening for the 115 ball, a spring supported by the bolt, and a bolster supported on said spring through an intermediate connection, substantially as described.

17. The combination in a car-truck having 120 an upper chord, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged 125 apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described. 130

18. In a car-truck, the combination with the side frames, of upper link-sections 26 pivoted to said frames, eyebolts 27 to which the links are pivoted, semi-elliptic springs through

which the eyebolts extend, springs on the eyebolts below said semi-elliptic springs whereby said semi-elliptic springs are elastically supported, and a car-supporting bolster supported by the said semi-elliptic springs, substantially as described.

19. In a car-truck, the combination with the side frames, of link-sections 26 pivoted to said frames, eyebolts 27 to which the links are pivoted, semi-elliptic springs through which the eyebolts extend, spiral springs 36 on the eyebolts below said semi-elliptic

springs, cup-shaped washers against which the spiral springs press, and a car-supporting bolster suitably supported on said semi-elliptic springs, substantially as described.

Signed in the city and county of Philadelphia, State of Pennsylvania, this 21st day of October, 1897.

GEORGE MARTIN BRILL.

Witnesses:

HENRY C. ESLING,  
EDW. P. RAWLE.



125

Supreme Court, District of Columbia.

JOHN A. BRILL et al.

vs.

THE WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

COMPLAINANTS' EXHIBIT.

*"Assignment."*

Samuel Bell, Examiner.

March 30, 1905.

Whereas, I, George Martin Brill, of Philadelphia, County of Philadelphia and State of Pennsylvania, did obtain Letters Patent of the United States for improvements in Car Trucks for Motor Propulsion, etc., which Letters Patent are respectively numbered 627,898, 627,899 and 627,900, and are respectively dated the 27th day of June, 1899; and

Whereas, I am now the sole owner of said Letters Patent and of all the rights under the same; and,

Whereas, John A. Brill, of the same place, is desirous of acquiring the entire interest in and to the same;

Now, therefore, to all whom it may concern, be it known that, for and in consideration of the sum of one dollar to me in hand paid, the receipt of which is hereby acknowledged, I, the said George M. Brill, have sold, assigned and transferred and by these presents do sell, assign and transfer unto the said John A. Brill the whole right, title and interest in and to the said improvements in car trucks, including any improvements thereon, and in and to the Letters Patent therefor aforesaid. The same to be held and enjoyed by the said John A. Brill for his own use and behoof, and for the use and behoof of his legal representatives to the full end of the term for which said Letters Patent are or may be granted, as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made.

In Testimony Whereof, I have hereunto set my hand and affixed my seal at Philadelphia, in the County of Philadelphia and State of Pennsylvania this 8th day of July, 1899.

[SEAL.]

GEORGE MARTIN BRILL.

In presence of

W. H. HEULINGS, JR.

HENRY C. ESLING.

Received and recorded July 11, 1899, Liber T-59, page 302,  
Transfers of Patents.

C. H. DUELL,  
*Commissioner of Patents.*

Exd.

K. H. M.

126 CITY AND COUNTY OF PHILADELPHIA,  
*State of Pennsylvania, ss:*

On this eighth day of July, in the year eighteen hundred and ninety-nine, before — personally came George Martin Brill, to me known, and known to me to be the individual described in and who executed the foregoing instrument, and he thereupon duly acknowledged to me that he executed the same.

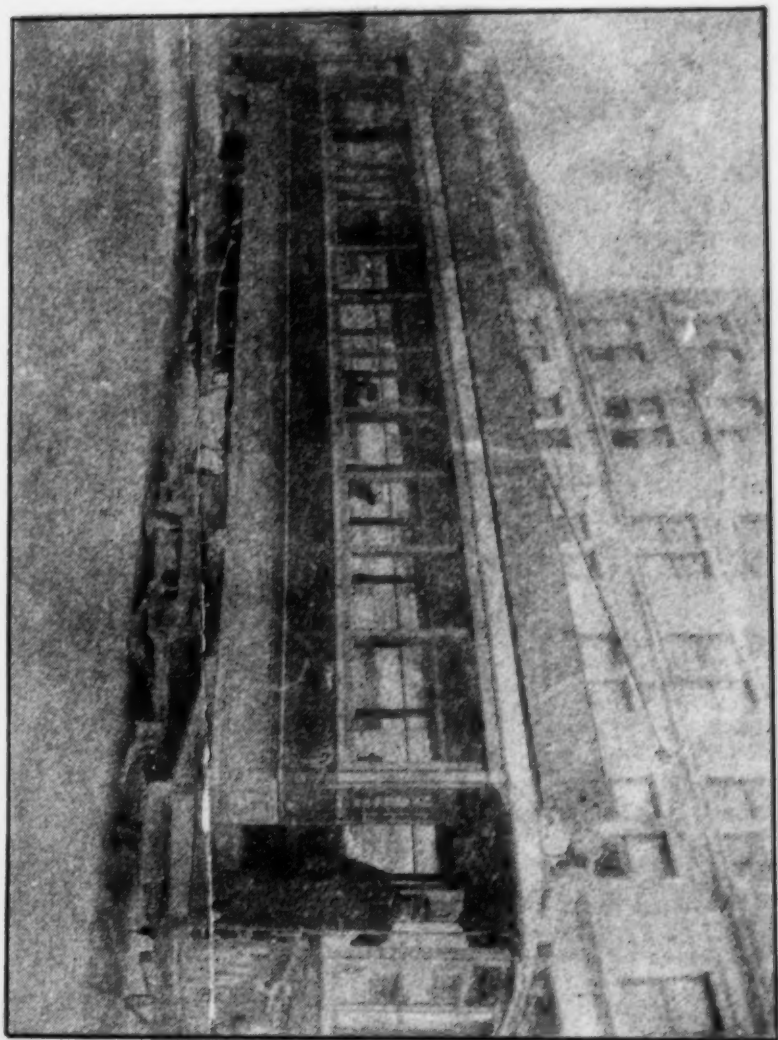
[NOTARY SEAL.]

HENRY C. ESLING,  
*Notary Public.*

[10c. Revenue Stamp.]

(Here follow diagrams marked pp. 127 and 128.)

(Here follow photographs, drawings, and specifications, marked pages 129 to 142.)



**CHART**

**TOO**

**LARGE**

**FOR**

**FILMING**



No. 635,986.

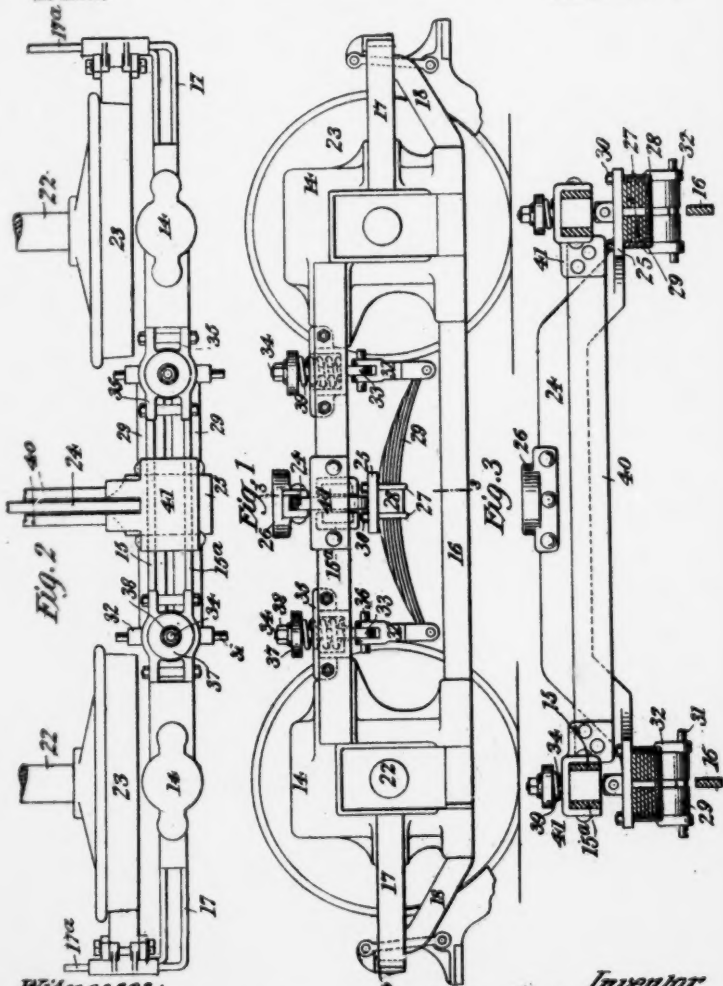
Patented Oct. 31, 1899.

C. F. UEBELACKER.  
CAR TRUCK.

(Application filed Oct. 26, 1907.)

3 Sheets—Sheet 1.

(No Model.)



Witnesses:  
Raphael Ketter  
W. C. Pinkney

Inventor  
Charles F. Uebelacker,  
By J. M. Brown, Attorney.



No. 635,986.

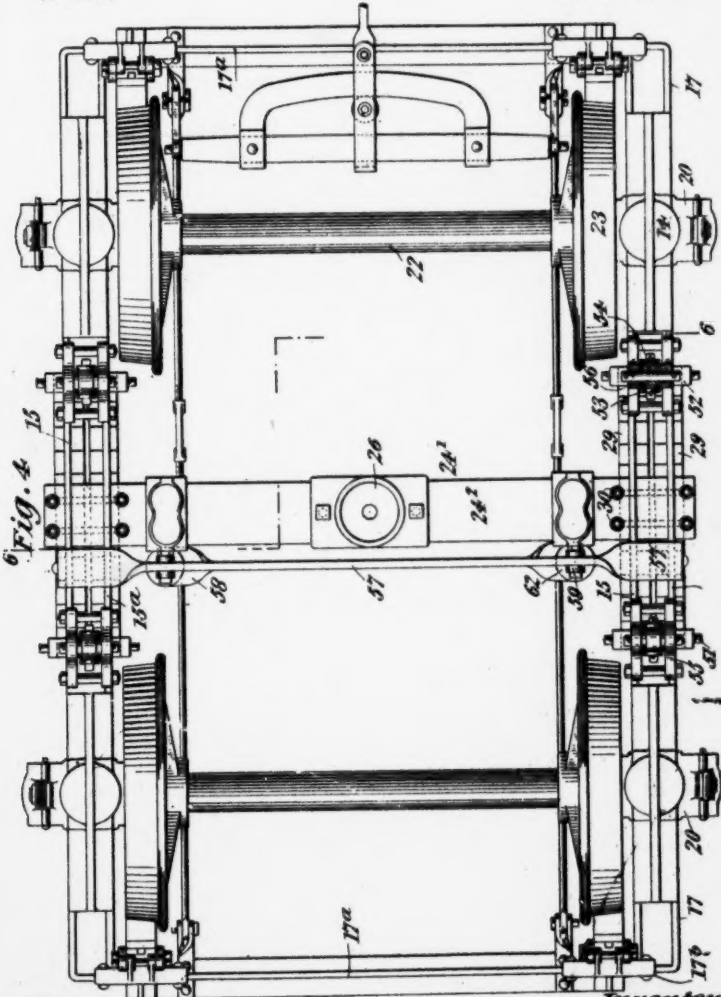
Patented Oct. 31, 1899.

C. F. UEBELACKER.  
CAR TRUCK.

(Application filed Oct. 20, 1897.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:  
Raphael Ketter  
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Inventor  
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Attorney





No. 635,986.

C. F. UEBELACKER.  
CAR TRUCK.

(Application filed Oct. 25, 1897.)

Patented Oct. 31, 1899.

3 Sheets—Sheet 3.

(No Model.)

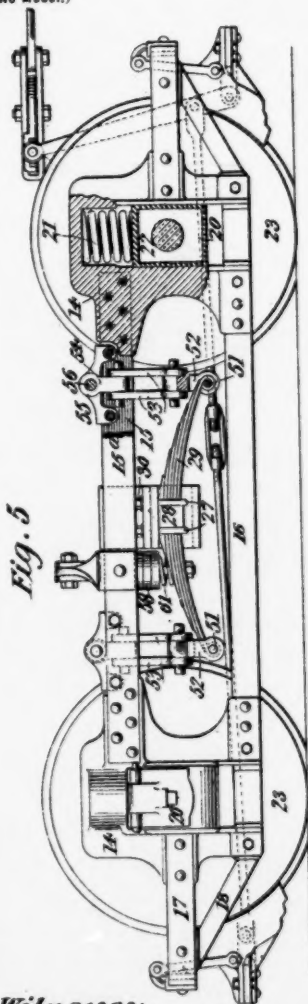
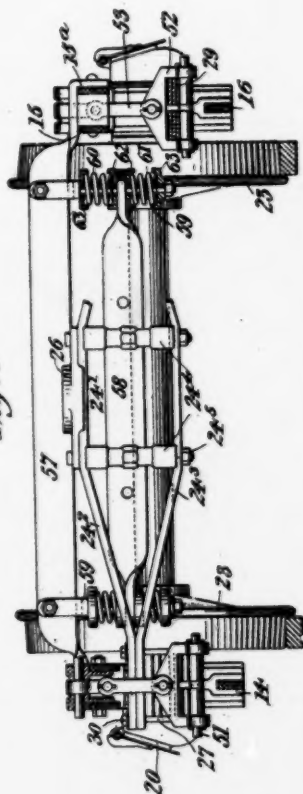


Fig. 5

Fig. 6



Witnesses:

Raphael Ketter  
H. C. Pinkney

Inventor  
Charles F. Uebelacker  
By J. E. H. Bone  
attorney



# UNITED STATES PATENT OFFICE.

CHARLES F. UEBELACKER, OF KINGSTON, NEW YORK, ASSIGNOR TO THE PECKHAM MOTOR TRUCK AND WHEEL COMPANY, OF SAME PLACE.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 635,986, dated October 31, 1899.

Application filed October 25, 1897. Serial No. 686,331. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. UEBELACKER, a citizen of the United States, and a resident of Kingston, Ulster county, State of New York, have invented certain new and useful improvements in Car-Trucks, of which the following is a specification.

This invention relates to improvements in car-trucks intended particularly for elevated or heavy suburban electric cars. The improvements are likewise adapted for cable or other street-railways.

The truck is of that class known as "double" trucks employed for supporting long car-bodies, the car being mounted upon a pair of the trucks.

The object of the present improvements is to construct a truck particularly adapted for carrying heavy car-bodies in high-speed service which shall support upon it a car-body through the instrumentality of a suitable center-bearing bolster in such manner that longitudinal as well as transverse movement of the car-body and supporting-bolster with relation to the truck structure may be provided for, so as to neutralize shocks imparted to the truck before such shocks can be transmitted to and affect the car-body. I accomplish this and other useful objects by the means hereinafter described, and more particularly set forth in the claims at the end of this description.

The accompanying drawings, forming part of this specification, illustrate in Figures 1, 2, and 3 a truck embodying my improvements, the remaining views showing a truck embodying the leading features of the invention. Fig. 1 is a side elevation of the truck; Fig. 2, a ground plan of one side of the same; and Fig. 3, a vertical cross-section along line 3 3 of Fig. 1, looking toward the left. Fig. 4 is a ground plan of a somewhat modified form of the truck; Fig. 5, a side elevation, partly in section; and Fig. 6, a vertical cross-section along line 6 6 of Fig. 4, looking toward the left. Portions of Figs. 4 and 5 appear broken away.

In the several views like features are indicated by the same numerals of reference.

The side frames of the truck comprise yokes or pedestals 14, upper longitudinal

beams 15 15', connecting the pedestals together at the top and preferably duplex, and lower longitudinal beams 16, connecting the pedestals together at the bottom, also end beams 17, connected to the pedestals 14 near the center of their vertical height, and preferably made duplex, as shown, and of less aggregate width than the upper longitudinal beams 15 15' and under truss-beams 18, extending from the outer lower ends of the pedestals 14 upward to the end beams 17, to which they are riveted. The central upper longitudinal beams 15 15', which are the supporting-beams of the suspending appliances, are preferably placed farther apart than the end beams 17. This is to permit of the requisite swing of the links supporting the half-elliptic springs, which are suspended below said beams 15 15', though, if desired, the end beams 17 may be spaced apart the same extent as the beams 15 15', as in Fig. 4.

The truck has a short wheel-base, and its side frames are constructed to afford great strength, the beams being preferably made of soft steel, hot-riveted to the pedestals, which are likewise made of soft steel, the upper beams being inlaid in suitable flanged recesses on the faces of said pedestals before being riveted thereto. Lower beams 16 have their ends secured in pockets cast in the lower members of the pedestals before being riveted to the latter, and the under truss-beams 18 are in like manner secured to the pedestals. The outer members of the duplex end beams 17 are carried around transverse of the truck, as at 17', and thus assist to hold the side frames in proper alignment. To the transverse end beams 17' are riveted the angle-beams 17'', which furnish supports for certain parts of the braking appliances. Braking mechanism is shown in the drawings, but forms no part of my present invention. The side frames of the truck as thus constructed afford the necessary stability for supporting the bolster and the weight imposed upon it at the wheel-base.

The journal-boxes are indicated at 20 and operate within the pedestals in the usual manner, 21 being spiral springs placed above the tops of the journal-boxes, (see Fig. 5,) said springs entering recesses in the top mem-

29 130 8737  
Here follow diagrams marked p. 1

bers of the pedestals 14 and serving to spring-cushion the truck on the journal-boxes. The truck-axes are marked 22 and the wheels 23.

Referring now to Figs. 1, 2, and 3, which embody the preferred construction, 24 indicates a swinging bolster, made of a heavy flat bar, set on edge, and having its ends sloped downward and outward beneath the duplex beams 15 15', its extreme end portions being constructed as horizontal base-plates 25. The bolster is provided with swivel-plate 26, to which the car-body is adapted to be connected in the usual manner. 27 27 indicate yokes supporting a central shoe 28, which envelops the leaves of the duplex half-elliptic springs 29. The ends of yokes 27 pass upward through the base-plates 25 and are held in place above the latter by screw-nuts 30. The ends of the springs 29 are bent around pins 31, which pass through the lower ends of the universal links 32 transverse to the truck, the upper central portions of said links being divided, so as to permit of inserting between the same the lower flattened heads 33 of bolts 34, which extend upward and are adapted to play between the duplex beams 15 15' and through shoes 35, secured to and between said beams 15 15', some lateral play being allowed to the bolts 34, so that they may accommodate themselves to changes in the spans and positions of the springs 29. By means of the pins 36 at right angles to pins 31 and longitudinally of the truck the logs forming the upper portions of universal links 32 are articulated to the heads 33 of bolts 34. 37 is a washer, and 38 a nut on bolt 34, a spiral spring 39 being inserted within a suitable recess of shoe 35 and interposed between the bottom of said shoe and washer 37, so as to yieldingly resist vertical play of the bolt 34.

In the construction described the suspending devices or appliances for the semi-elliptic springs are increased in length by supporting the upper ends thereof from the upper edges of the upper side beams and preferably by supporting said upper ends at a distance above said upper edges. This is done in the construction of Fig. 1 by extending the springs 29, which support the bolts 34, a distance above said upper edges, as shown. This lengthening of the suspending appliances is found advantageous, particularly because it gives an easier swinging bolster. By means of the recess in bracket 35 the lengths of springs 39 are increased as they extend both above and below the supporting edges of the upper beams. This gives a good elastic support. The links 32 have a swinging motion on their supporting pivot-pins. There is also a further swing of the pivots themselves, owing to the elastic support at the upper ends. The latter motion, which may result from longitudinal movement of the bolster, compresses springs 39 more on one side of the spring than on the other, which tends to return the bolster to central position.

The numerals 40 indicate a pair of trans-

verse bars or transoms of U-shaped cross-section fixedly secured to shoes 41, riveted to the duplex beams 15 15' and between which the bolster 24 operates. The transoms add stiffness to the truck-frame laterally and serve to hold the transverse end beams 17' in rigid alignment. They also serve as a guide for the bolster 24 to prevent its movement to any considerable extent in a direction longitudinal with the car-body, and they further serve to transfer the draft of the propelling-motors from the truck to the car-body.

The drawings show a pair of half-elliptic springs 29 at each side of the truck-frame for supporting the ends of the bolster; but a single spring may be used, or more than two, the number depending on the weight of the car-body to be carried by the truck. By providing for the swinging of the bolster longitudinally with relation to the truck the latter is permitted to start in advance of the car-body and to thus impart its movement to the car-body without abruptness owing to the action of springs 29, which, being capable of varying their span and being supported by links yieldingly suspended, will neutralize in a measure sudden shocks imparted to the truck. The location of the half-elliptic springs between the beams of the side frames of the truck permits the drawing down of the bolster to the narrowest permissible width, thus shortening the wheel-base of the truck. This location of the semi-elliptic springs also imparts to them the properties of an equalizer, permitting any of the wheels to rise independently of the car-body and supplementing in this way the action of the pedestal-springs 21, located directly over the journal-boxes.

Referring to Figs. 4, 5, and 6, it will be seen that the construction of the side frames of the truck is substantially the same as that shown in the views of the drawings above described. In Figs. 4 to 6 the bolster 24' is constructed as a truss, comprising a top chord 24', bottom chord 24'', and suitable stays 24''' between the central portion of said chords, which are held in place by bolts 24''' in the usual manner. Each end of the bolster 24' is secured to the central shoe 28 of a pair of semi-elliptic springs 29 by yokes 27 and screw-nuts 30. The outer ends of said springs embrace pins 31, passing through the lower ends of yokes 32, forming parts of suspending appliances constructed similar to portions of chains, the upper links of which are represented by 33 and 34.

Fixedly secured to the duplex beams 15 15' are the brackets 55, carrying pivots 56, around which links 54, and with them lower links 53 and yokes 52, are adapted to swing, thus providing for changes in the spans of the springs 29 produced by varying loads and for the swinging of said springs and the car-body supporting bolster resting thereon longitudinally as well as laterally with relation to the truck-frame. The bolster 24' may be guided between transoms secured to the duplex beam-

15 15° and when employed will perform the same functions as the transoms shown in Figs. 1 to 3.

A flexible support for the nose of an electric motor is embodied in the construction illustrated by Figs. 4 to 6, wherein 57 is a flat bar secured to the duplex beams 15 15° a suitable distance from the bolster and set on edge, except at its ends, where it is deflected so as to fit over the top edges of the beams 15 15° and against the outer surface of the outer beam 15°. Yieldingly suspended from said bar 57 by bolts 59, forked at their upper ends around the bar 57, to which they are attached, is the bar 58, adapted to support the nose of the motor at a suitable elevation. The bar 58 is also flat and is set on edge, with its ends deflected into horizontal portions, through which the suspending-bolts 59 pass, the horizontal ends of the bar 58 being between suitable shoes 62, within which spiral springs 60 and 61, which surround bolt 59, seat, the said springs also seating in similar shoes 63 on bolt 59 above and below the shoes 62. By this arrangement the spiral springs 60 and shoes 62 are adapted to play up and down on bolt 59, thus affording to the bar 58 a suitably-yielding support.

I do not wish to confine myself to the details and combinations of details herein set forth, as it will readily be seen by those acquainted with truck-building that various modifications might be made as to same without departing from the spirit of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car-truck, the combination with the side frames, comprising pedestals, duplex upper beams, and lower beams between the pedestals, of a car-body-supporting bolster, bolster-supporting spring-supports supported center-bearing from said side frames to permit the bolster to move vertically, and appliances suspended from the duplex upper beams of said side frames and sustaining the spring-supports for the bolster and permitting the latter to move transversely and longitudinally with reference to the side frames.

2. In a car-truck, the combination with the side frames including upper and lower longitudinal beams, of half-elliptic springs suspended between said upper and lower side beams and a car-body-supporting bolster consisting of a flat bar set on edge and provided with horizontal base-plates at each end, appliances connecting said base-plates to aforesaid half-elliptic springs, and link appliances connected to the ends of said springs and suspended from the upper longitudinal beams of the side frames.

3. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes,

of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, springs upon which the ends of the bolster rest and to which they are connected, and suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams.

4. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, springs upon which the ends of the bolster rest and to which they are connected, suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams, and springs in the pedestals over the journal-boxes.

5. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, half-elliptic springs upon which the ends of the bolster rest and to which they are connected, and suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams.

6. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, half-elliptic springs supporting the bolster, suspending appliances for said springs supported from said beams and extending from a distance above the beams to the half-elliptic springs below the beams, and springs between said beams and the upper ends of said suspending appliances.

7. In a car-truck, the combination with side frames having pedestals and beams connecting them, of a bolster springs 29 supporting the bolster, suspending appliances for said springs supported from said beams and extending from a distance above the beams to springs 29 below the beams.

8. In a car-truck, the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported by said beams and extend-

ing from a distance above the beams to springs 29 below the beams, and springs between the beams and the upper ends of the suspending appliances.

9. In a car-truck the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported by the upper edges of said beams, and springs between said beams and the upper ends of said suspending appliances, said springs supporting said appliance on the beams.

10. In a car-truck the combination with the frame having pedestals and side beams connecting them near the tops of the pedestals, of brackets on the beams, springs supported by the brackets and extending above them, suspending appliances supported by said springs, springs 29, and a bolster supported thereby.

11. In a car-truck the combination with the frame having pedestals and side beams connecting them near the tops of the pedestals, of brackets on the beams, the brackets having recesses extending below the supporting part of the bracket, springs supported by the brackets in said recesses and extending above them, suspending appliances supported by said springs, springs 29, and a bolster supported thereby.

12. In a car-truck the combination with a bolster and springs 29, of links 32, bolts 34 pivotally connected to the links, and means for elastically supporting said bolts from the upper ends thereof.

13. In a car-truck the combination with a side frame, a bolster, and springs 29, of links 32, pins 31 connecting said links and springs,

bolts 34, and pivot-pins 36 at right angles to pins 31 and connecting the links and bolts.

14. In a car-truck the combination with a side frame, a bolster and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts, and springs supporting the bolts 34 from the side frame.

15. In a car-truck the combination with a side frame, a bolster and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts, a washer 37 held at the top of bolt 34, and a spring 38 supporting the washer and bolt.

16. In a car-truck the combination with a side frame having pedestals and duplex beams connecting the pedestals near the tops thereof, a bolster, and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts.

17. In a car-truck the combination with pedestals and beams connecting them near the top, of a bolster, springs 29 below and supporting the bolster, links, pins extending in the direction transverse to the truck connecting said springs and links, pins at the upper ends of the links longitudinally of the truck, and means supported by the beams and connected to said longitudinal pins.

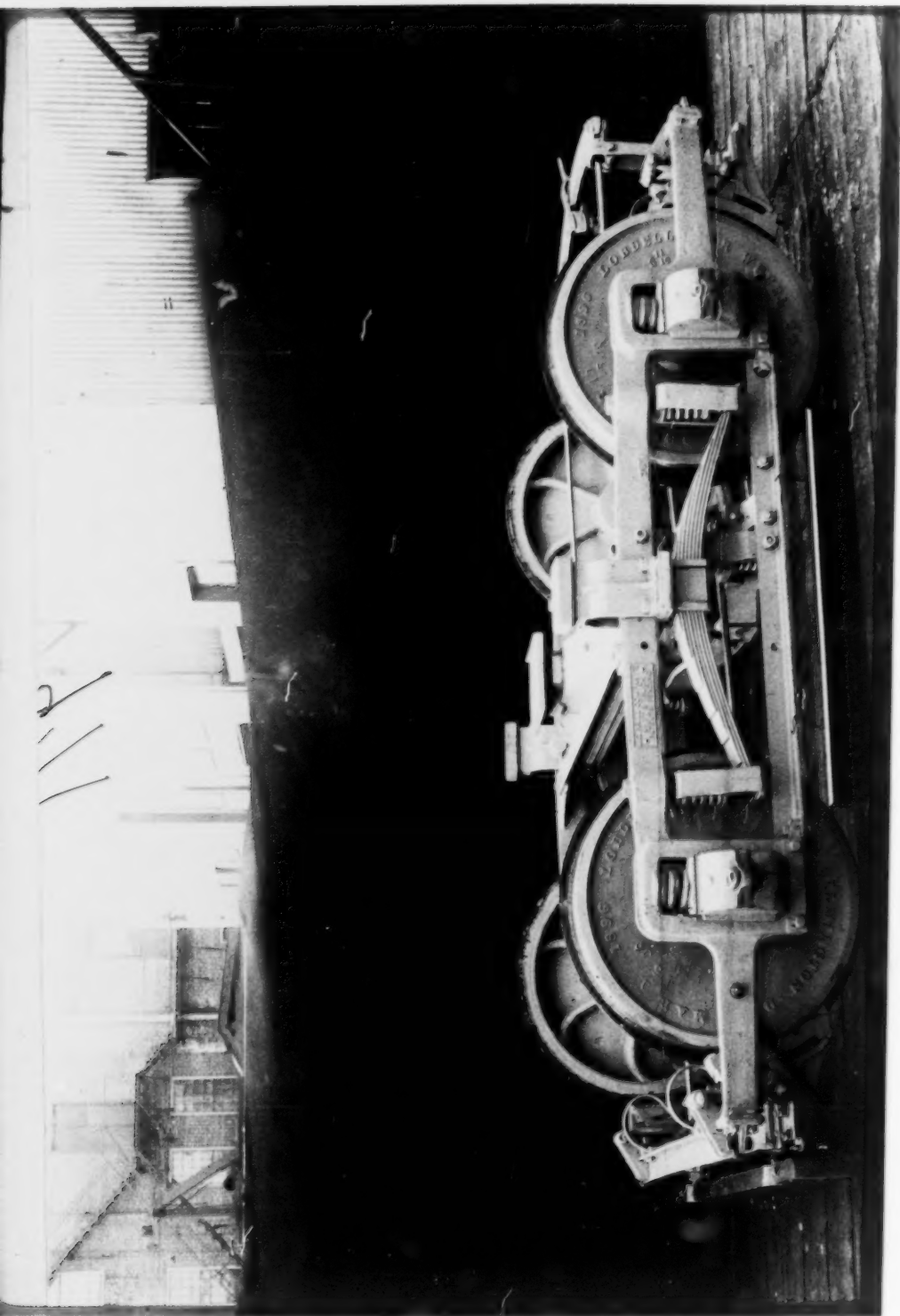
Signed at New York, in the county and State of New York, this 4th day of August, 1897.

CHARLES F. UEBELACKER.

Witnesses:

J. E. M. BOWEN,  
C. HOLLOWAY.

*Here follow diagram marked p*

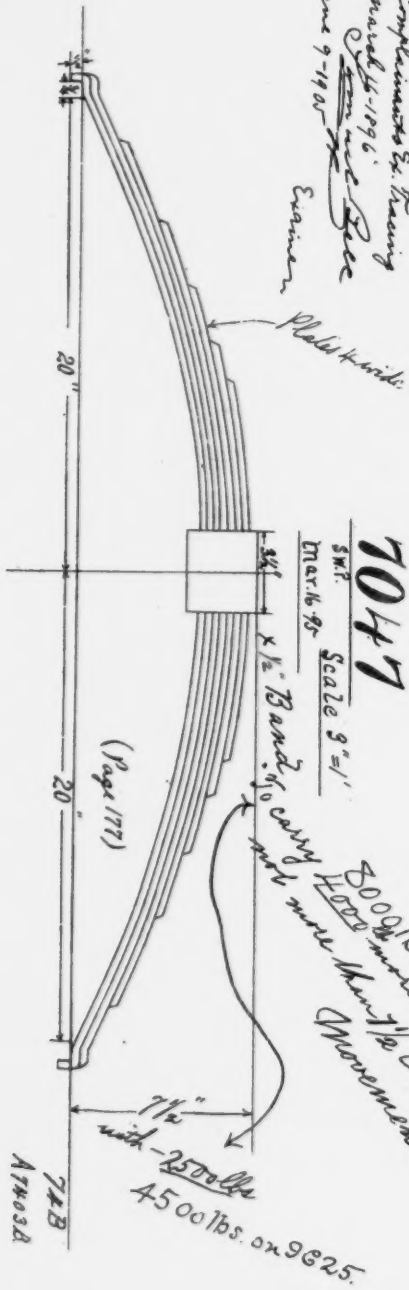








Supreme Court Dist of Col  
 Bill et al  
 vs  
 Mack Ruy & Elce Co  
 Complainants vs. Defending  
 Moved H-1896  
 June 9-1905  
 Examiner



**CHART**

**TOO**

**LARGE**

**FOR**

**FILMING**

# 27 B TRUCK

- 7047 -

*Showing arrangement of Half Elliptic Spring*

*Swing Link.*

J.C. BRILL CO.

PHILA.

Scale: - 3" = 1'

Drill v. No. Jersey Street Ry. Co.  
U.S. C.C. - D.C. N.J.

"Complainant's Exhibit 27"  
Tracing 27 B Truck #5-25-96"

H.D.O.  
Exr.

Supreme Court Dist. of Columbia

Brill et al

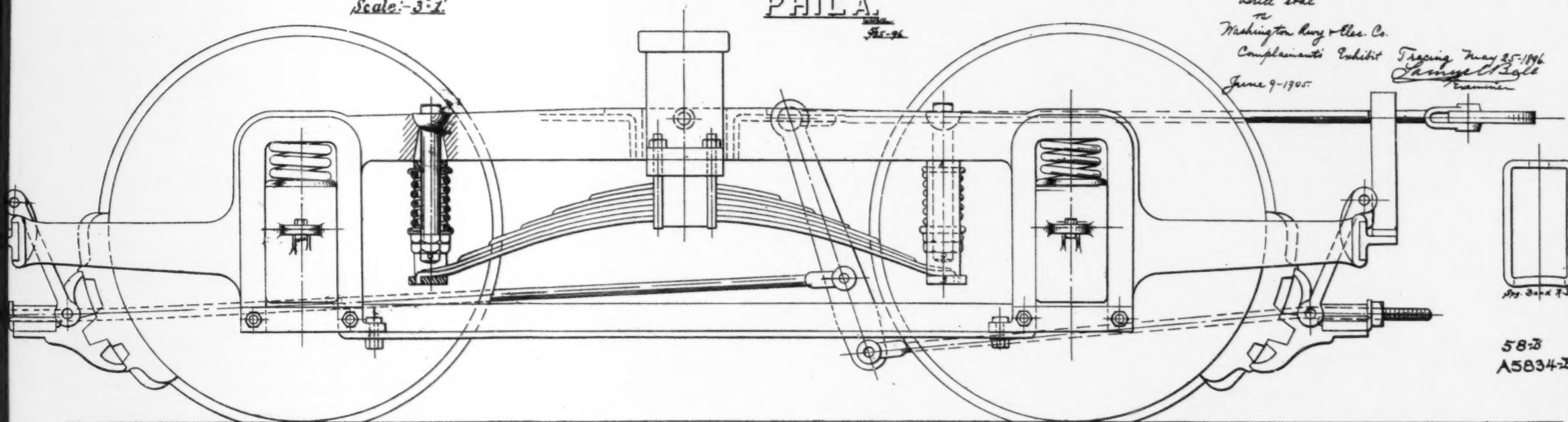
Washington Ry. & Elec. Co.

Complainant's Exhibit

June 9-1905

Tracing May 25-1896  
George C. Ball  
Examiner

179



58-3  
A5834-2



143

Supreme Court, District of Columbia.

BRILL

vs.

THE WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

"COMPLAINANTS' EXHIBIT CERTIFIED COPY THYNG PATENT."

Samuel Bell, Examiner. June 16, '05.

2-389.

UNITED STATES OF AMERICA,  
DEPARTMENT OF THE INTERIOR,  
PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify, That the annexed is a true copy from the records of this office of the specification in the matter of the letters patent granted Levi B. Thyng, November 18, 1845, No. 4276. Antedated May 17, 1845, for improvement in hanging car bodies.

In testimony whereof, I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the city of Washington this twenty-second day of November, in the year of our Lord one thousand nine hundred, and of the independence of the United States of America the one hundred and twenty-fifth.

[SEAL.]

C. H. DUELL,  
*Commissioner of Patents.*

[Cancelled 10c. Revenue Stamp.]

*Thyng Specification.*

LEVI B. THYNG. Hanging Car Bodies. Patent No. 4276, Dated Nov. 18, 1845. Antedated to May 17, 1845.

To all whom it may concern:

Be it known, that I, Levi B. Thyng, of Lowell, in the County of Middlesex and State of Massachusetts, have invented a new and improved mode of hanging the railroad car body to its carriage or truck; and I do hereby declare that the following is a full, clear and exact description:

The nature of my invention consists in supporting the car body on a flexible or equalizing bolster, and suspending and governing the lateral motion of the same by shackles attached to the truck or carriage frame, thereby giving the car ease when in motion.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation: I construct a flexible or equalizing bolster (A, Fig. 1st), as shown by the accompanying drawing of two or more pieces of wood twelve inches wide

and three inches thick, or of such thickness as is necessary to support the car body and its freight; the length of the bottom piece or plank (B, Fig. 2d) is two inches longer than the outside width of the truck frame (a a, Fig. 1st); the top surface of this part of the bolster is placed nearly or quite in contact with the bottom surface of the truck frame; the other part, or plank (c Fig. 2d) is of the same width and may be four inches shorter than the inside width of the truck frame; this allows the bolster to move endwise and the car body to move laterally independent of the truck; the top part (c Fig. 2d) of the bolster is tapered at the ends (b b) sufficient to spring whenever there is an inequality of weight on the bearing points (c c, Fig. 2d); these points (c c) together with the coupling at the center, support the car body (D Fig. 2d); the bolster is fastened together by bolts passing through the center and securing the bottom coupling to the same; the bolster is supported by springs (E, Fig. 3d), one at each end; these springs are immediately under and parallel with the truck frame, each end of these springs are supported and attached by shackles (d d, Fig. 3d) about 3 inches long between joints, to studs (e e, Fig. 3d), which are secured to the truck frame. The bolster is allowed to move endwise freely between two girts in the truck frame; this motion, which gives the car body its lateral motion, is governed by the shackles, and will be more or less according to their length, the longer the shackles the greater the motion.

This arrangement in hanging and supporting the car body gives it a very gentle and easy motion in passing over an undulating or zigzag rail.

What I claim as my invention and desire to secure by letters patent is the mode herein described of hanging the car body and governing its lateral motion, that is to say, the spring bolster constructed and governed in its motions substantially as herein described in combination with the springs and shackles, the whole being constructed and operating substantially as herein set forth.

Lowell, November 10, 1845.

LEVI B. THYNG.

JOEL ADAMS,  
JOHN A. KNOWLES,  
*Witnesses.*

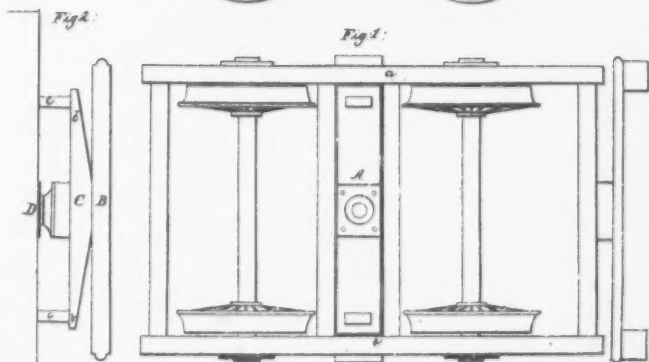
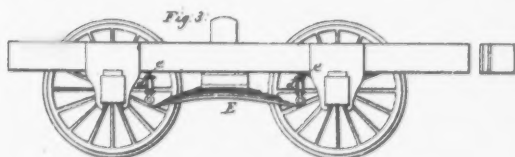
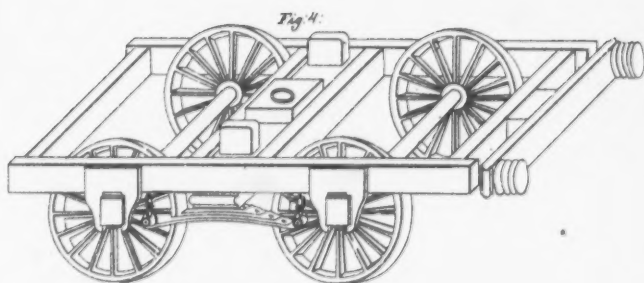
(Here follow diagrams marked pp. 144a to 166.)



L. B. THYNG.  
RAILROAD CAR.

No. 4,276.

Patented Nov. 18, 1845.



Witnesses:  
F. A. [illegible]  
J. [illegible]

Inventor  
L. B. Thung

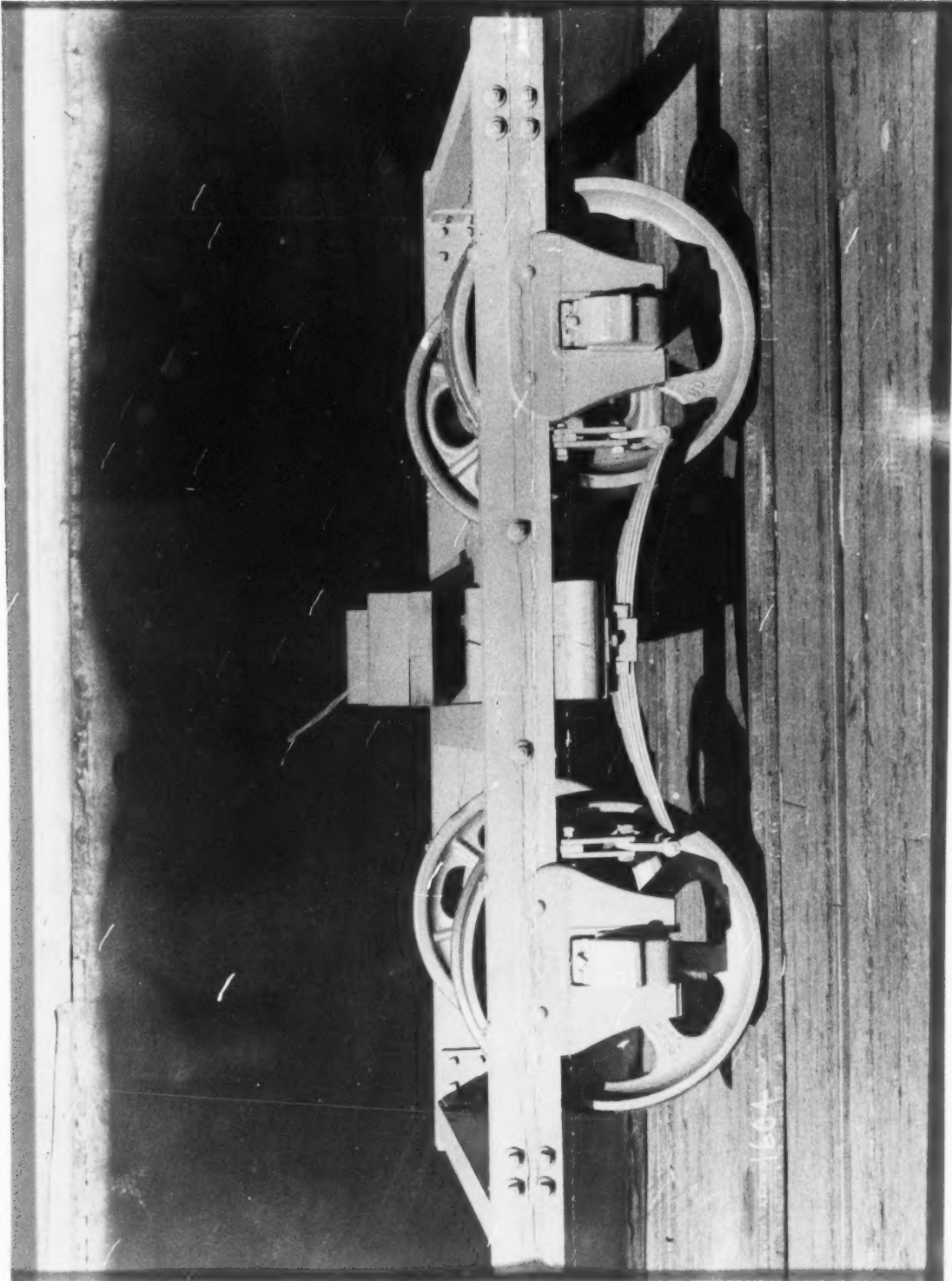
**CHART**

**TOO**

**LARGE**

**FOR**

**FILMING**



POOR COPY

Levi B. Hyngs  
Improvement in the way

184

Patented Nov. 18. 1845.

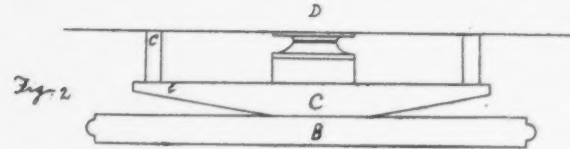


Fig. 2

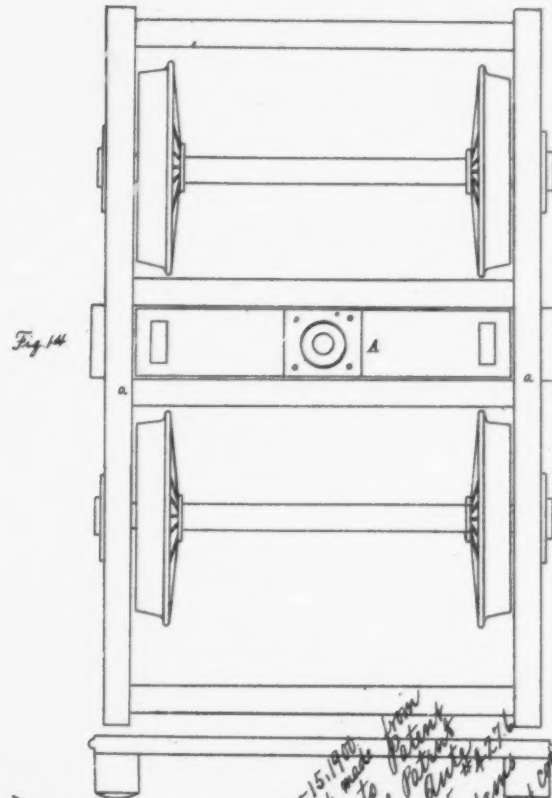
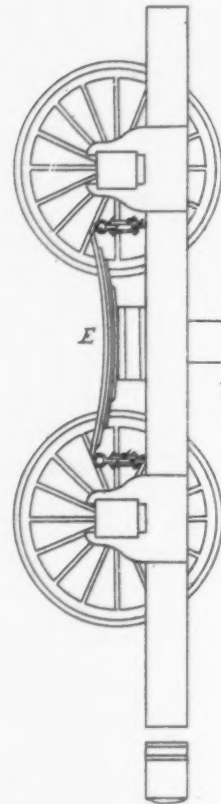


Fig. 14



Supreme Court of the District of Columbia  
John A. Bell et al.  
vs.  
The Washington Railway & Electric Co.

"Compliments Exhibit"  
Certified Copy  
Hyng Patent  
Drawing

Samuel Bell  
Examiner

Fig. 3

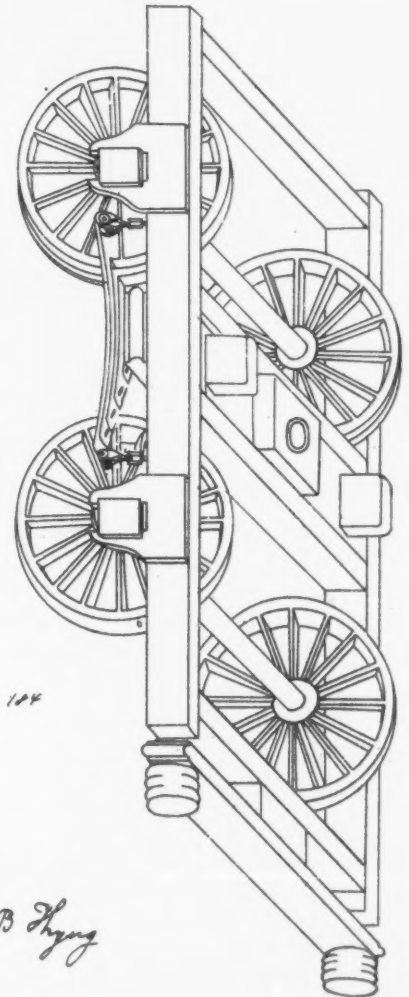


Fig. 4

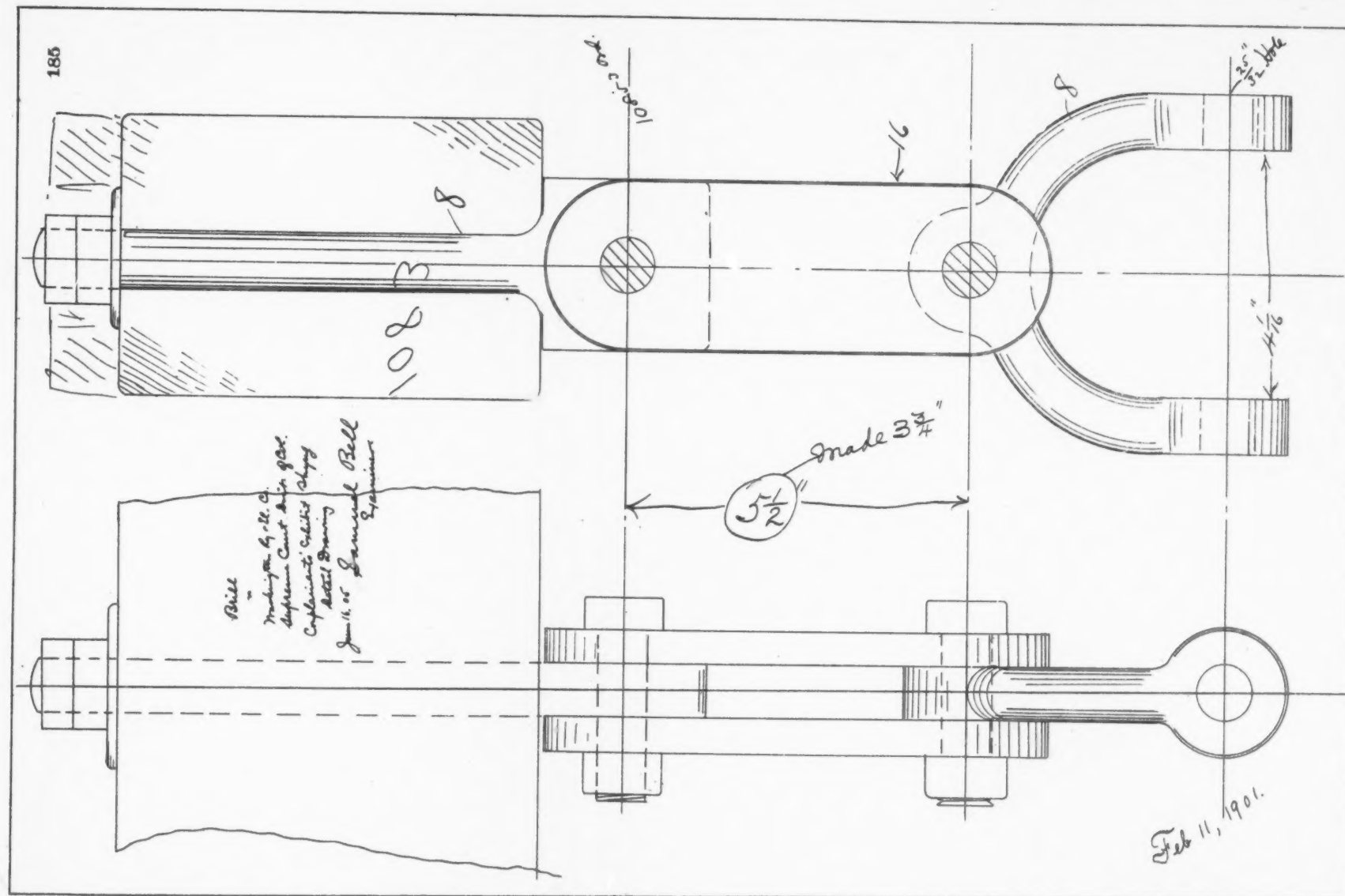
Page 104

2005

Nov. 15, 1845  
New print made from  
Office attached to Patent  
dated Nov. 18, 1845.  
Serial May 17, 1845  
Walter S. Adams  
Certified a correct copy  
W. H. Williams Jr.  
Edw. A. Rawls

Signed in presence of  
Samuel Bell  
John A. Bell

Levi B. Hyng

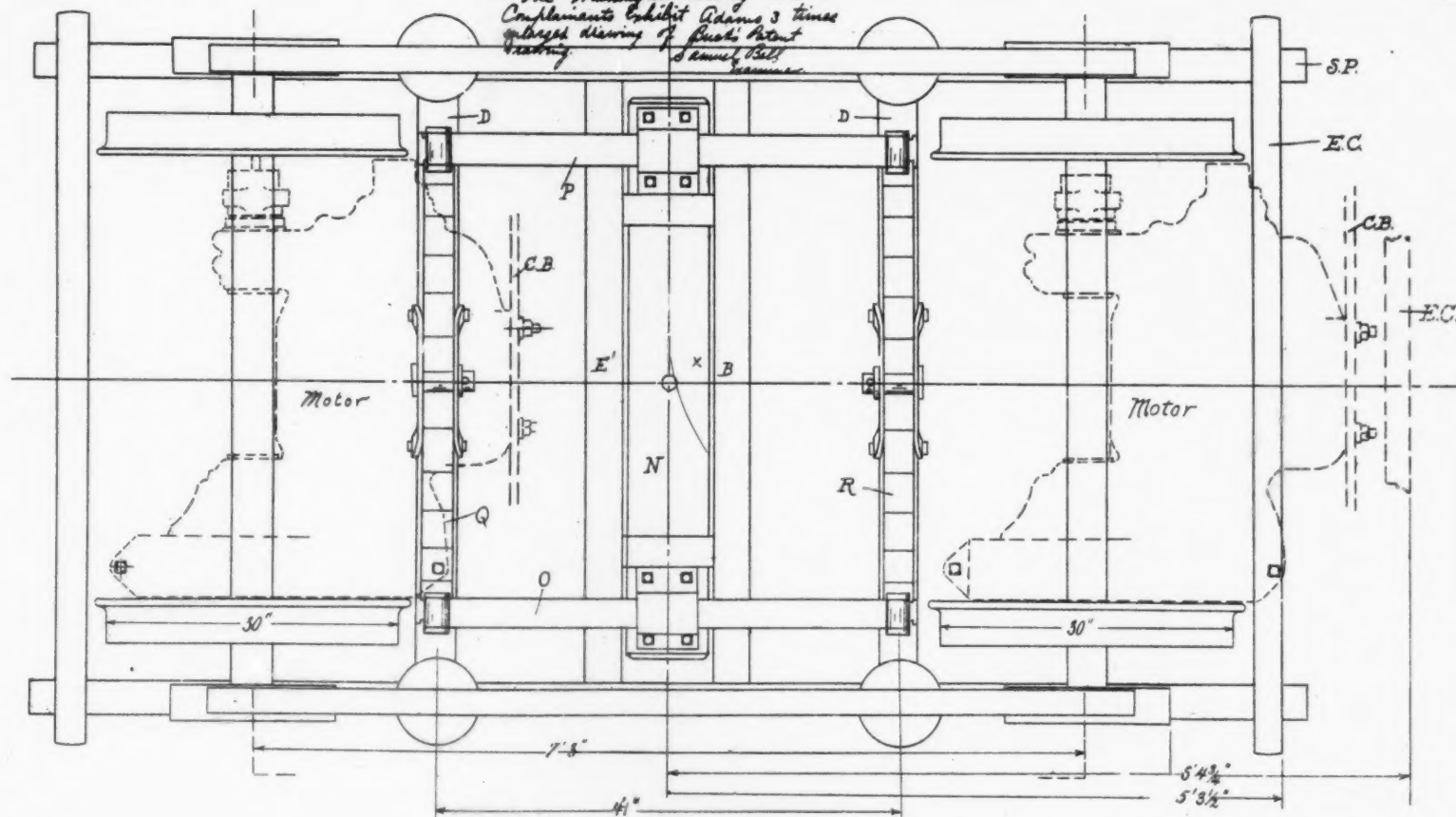






Supreme Court District of Columbia  
 John A. Brill et al  
 The Washington Railway Elec. Co.  
 Compliments Exhibit Adams 3 times  
 original drawing of Brush Patent  
 tracing

188



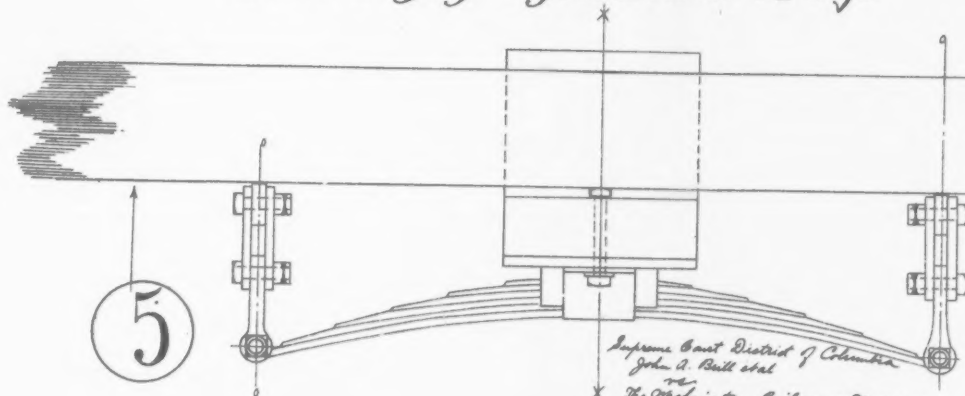
Reproduction of Patent Office Copy.  
 Enlarged 3 times. (With addition of motors at each end shown by dotted lines.)

(Page 188)

DRAWER NO 588  
 TRACING NO B58163

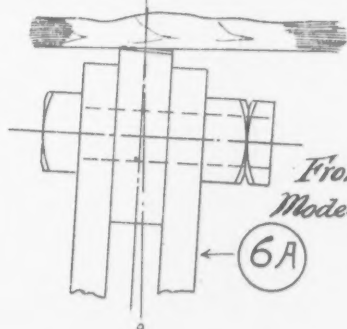
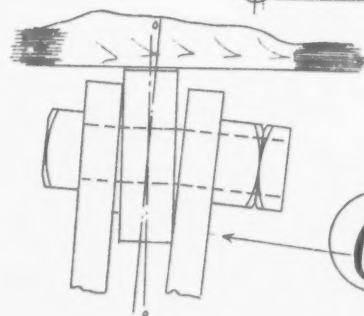
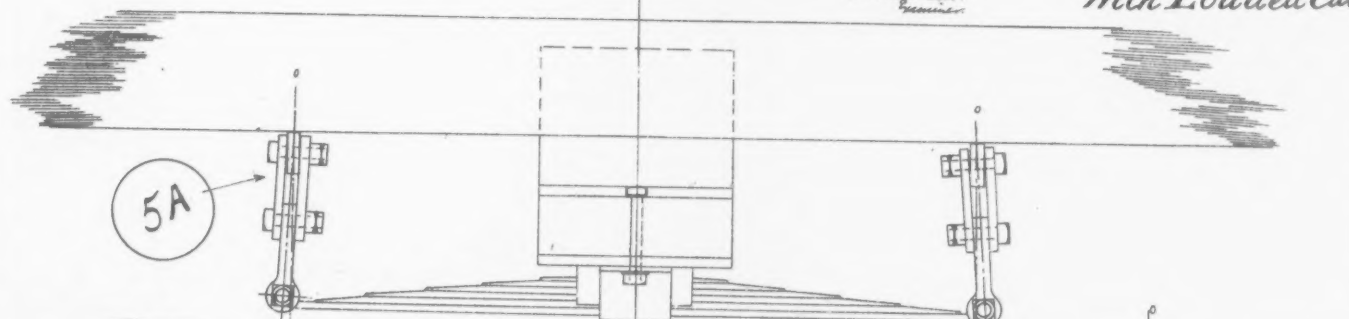
*From Thyng-Pyott Trucks. 1/4 size*

*With Car Body but  
Passenger  
Without Load*

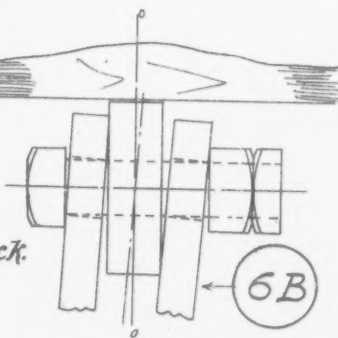


*Supreme Court District of Columbia  
John A. Bell et al  
vs  
The Washington Railway & Electric Co.  
Supplemental Exhibit Adams  
Illustration Dated June 30, 1905  
James Bell  
Plaintiff  
Defendant*

*With Loaded Car*



*From Dfts Ex-  
Model Thyng Truck.*



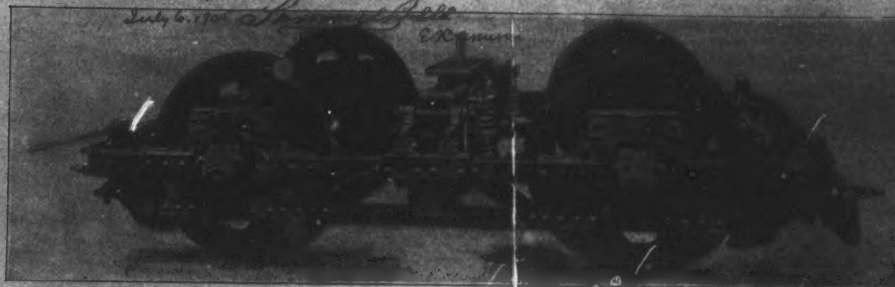


1512

## PECKHAM'S SYSTEM OF "DOUBLE" ELECTRIC TRUCKS.

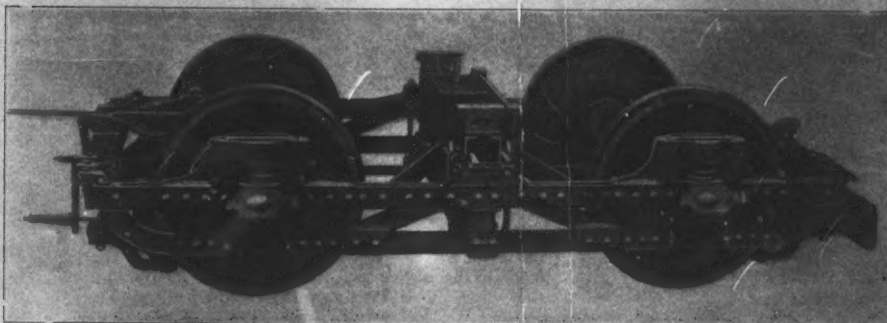
*Exhibit at Washington by Oct. 6**Ex. 4 1896**"Compliments Exhibit Street"**Railway, Chicago, October 1896**July 6, 1896*

CONTINUED.

*(8 sheets, sheet 2)**Examine*

CENTER BEARING, "SWING BOLSTER"—NO. 14-A.

This truck was designed for high-speed suburban, interurban or elevated railway service. Its construction is similar to the "extra strong" No. 14, just described, except its bolster, which is constructed to swing, in accordance with the best steam railroad practice. The "swing bolster" consists of channel bars supported by elliptic and spiral springs upon a steel-spring plank, which, in turn, is supported by links from the transom bars between which the swing bolster is located. The bolster is supported between the transom bars by half elliptic and spiral springs resting upon the spring plant and so graduated in strength that the springs come into action as the load increases. The transom bars are secured in pockets firmly to the side frames of the truck and fit closely to the sides of the bolster so as to prevent lateral motion; they are provided with corner braces to keep the truck alignment. The side frames are supported on the journal boxes by double spiral springs (sufficiently strong to support the entire weight of the car body and load). The brakes are of the double-lever style used on Peckham double trucks, are very powerful, and can be operated either by hand or power as desired.



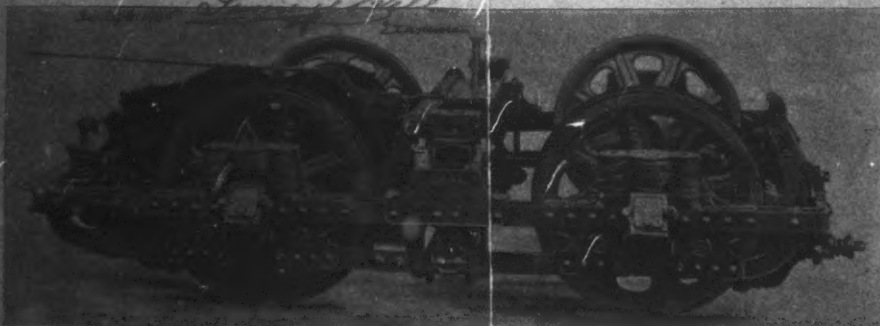
CENTER BEARING SWING BOLSTER "EXTRA STRONG"—NO. 14-A.

This truck was designed for extra-heavy "high speed" suburban elevated or trunk line service. Its design is the same as the 14-A, previously described, but of much stronger construction throughout; the side bars and pedestals being much heavier and the journal boxes larger and fitted with M. C. B. covers.

## PECKHAM'S SYSTEM OF "DOUBLE" ELECTRIC TRUCKS.

*Patent filed March 10, 1908, No. 840,111, U.S. Pat. Office.*  
*"Compliments" Scribner's Book Review*  
*Journal, October 1908 (5 plates, plate 3)*

CONTINUED.



CENTER BEARING, SHORT WHEEL BASE—NO. 14-B, AS CONSTRUCTED FOR ONE MOTOR.

This truck was designed to meet the demand for a truck, the wheels (all of the same size) of which would radiate between the sills of an ordinary car, so as to reduce its height from the rail, and that can be operated successfully upon railways with curves of such small radius (30 ft. or less) that the ordinarily constructed truck, with motors hung in the center and requiring a wheel base of at least 5 ft. 6 in., could not be operated successfully. The design of this truck is such that the wheel base (if desired) can be reduced to 3 ft. 6 in.; to accomplish this the motors are suspended outside the axles. The bolster may be flexibly supported by elliptic springs, as shown in the No. 14 trucks (previously described), but preferably are constructed of the swing bolster style as used in the 14-A trucks. The side frames and other portions of the truck are of the same design as Nos. 14 and 14-A. It is constructed for either one motor or two motors, as shown herewith. When one motor only is used, 65 per cent traction is obtained on the driving wheels. Several hundred of these trucks are in service under different lengths of car bodies and are giving entire satisfaction.



CENTER BEARING, SHORT WHEEL BASE—NO. 14-B, AS CONSTRUCTED FOR TWO MOTORS.

## PECKHAM'S SYSTEM OF "DOUBLE" ELECTRIC TRUCKS.

*Drill Hall, & Washington Ry & El. Co.*

*D. C. & S. F. C.*

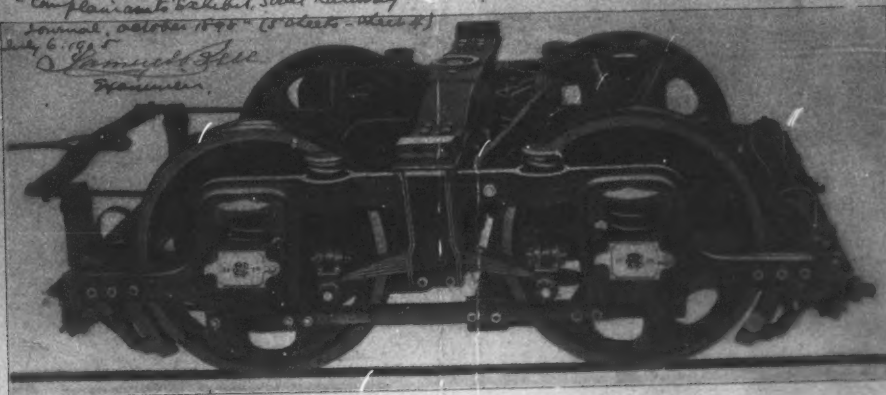
*"Complan's" Seattle, Wash. Street Railway*

*Journal, October 1895 (18 wheels - wheel 4)*

*July 6, 1895*

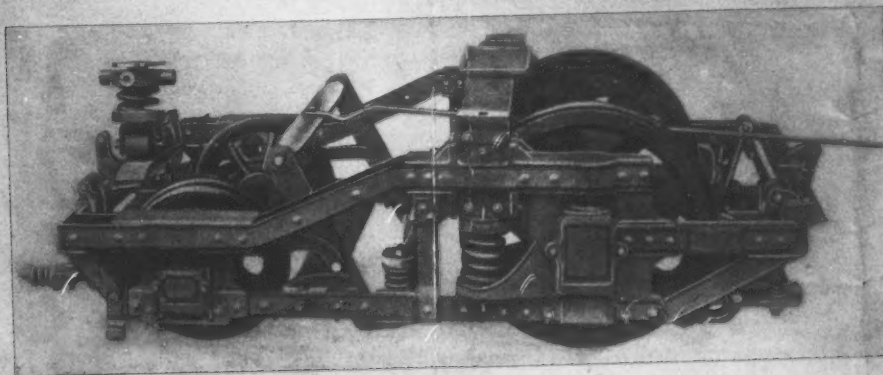
*Hammer*

CONTINUED.



SHORT WHEEL BASE "JERSEY SPECIAL" CONSTRUCTED FOR ONE MOTOR ONLY.

This truck is constructed for one motor only, with the motor suspended in the center of the truck between the axles. The side frames are constructed of one piece of cast steel and are supported upon the journal boxes by spiral springs, the same as all Peckham trucks. The bolster has a swinging side motion and is suspended from the side frames upon two half elliptic springs, one at each end, which are in turn suspended from the side frames upon spiral springs, making three complete sets of springs between the car body and rail. This arrangement of springs insures a very easy riding car. The journal boxes are provided with spring lids. The brakes are of the gravity style, which does away with the use of links for suspending the brake beams (as ordinarily used), and reduces the wearing parts and prevents noise.



"MAXIMUM TRACTION," "MIDDLESBROUGH SPECIAL."

This truck is of special construction, designed expressly for the Middlesbrough, Stockton & Thornby Electric Tramways, Middlesbrough, England, where one hundred of them (fifty equipments) are now in use. They are so constructed that the small wheels project toward the ends of the car bodies, instead of the larger wheels as ordinarily used. This construction allows the trucks to be placed nearer the ends of car bodies, as the small wheels will swing under the platform timbers. This arrangement is preferable on short curves, as it enables the trucks to be placed further apart and gives a greater distance between the king bolts, which is desirable where short cars are used.



## PECKHAM'S SYSTEM OF "DOUBLE" ELECTRIC TRUCKS.

*Illustrated in the Washington Post & Co.*

*• Supplement "Electric Street Railway Journal" October 1907 (Sheet 10 of 12)*

*July 6, 1907*

*Thomson & Brown*

*97 Avenue*

COSTUME



EXTRA STRONG "SWING BOLSTER" NO. 12.

This truck is designed for heavy suburban and trunk line passenger service. One of the special features embodied in it is the arrangement of springs, which are so placed as to give three complete sets of supporting springs between the car body and the rail, so as to ensure a very easy riding car. The truck is provided with a "swing bolster" supported upon half elliptic springs, which in turn are supported upon spiral springs upon the side frames to the track. The side frames are supported upon spiral springs resting upon the journal boxes, thus making three sets of supporting springs as previously mentioned. The journal boxes are of the M. C. B. Standard style. This center bearing "swing bolster" swings between the transom bars and is secured to the side frames of the truck, as shown in the above cut.



"EXTRA HEAVY" LOCOMOTIVE NO. 11.

This truck is designed for "extra heavy" locomotive service under heavy trunk line cars where trailers are used. It weighs without motors about 10,000 lbs. The side frames are constructed of steel castings all in one piece. The bolster is center bearing and of the swinging type, and is supported from the transom bars by links, the same as in Nos. 12-A and 12-B Trucks, only made heavier. The springs supporting the bolster, of which there are several, are full elliptic in shape.

**CHART**

**TOO**

**LARGE**

**FOR**

**FILMING**

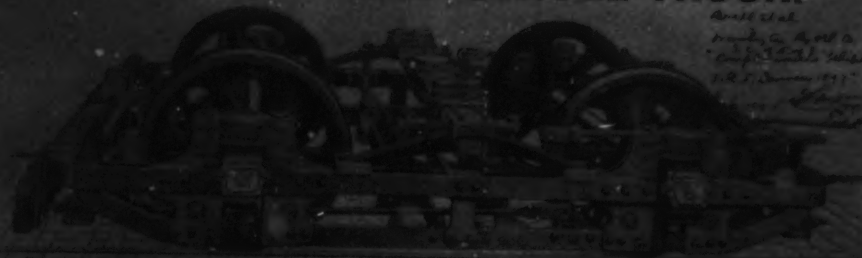
THE PECKHAM MOTOR TRUCK & WHEEL COMPANY  
 Havemeyer Building, 26 Cortlandt Street, New York.  
 Chicago Office, 120 N. La Salle St.  
 San Francisco Office, 120 N. California St.  
 London Office, 120 N. Victoria St.

February, 1917

STREET RAILWAY JOURNAL

129

# Peckham's "Double Cushioned" CENTER BEARING SWIVEL TRUCK.



*Am. & Eng. R.R. Review, April 2, 1917*  
*"Double Cushioned" Truck*  
*U.S. Patent 1,250,000*  
*Peckham & Co., Inc.*

DESIGNED EXPRESSLY FOR LONG ELECTRIC CARS.

Especially Adapted for HIGH SPEED SUBURBAN SERVICE.

## SPECIAL MERITS.

INDEPENDENT (Half Elliptic) BOLSTER SPRING SUPPORT FOR CAR BODIES.

The (Half Elliptic) Bolster Springs take up the inequalities of the Track and ensure an easy riding car.

INDEPENDENT (Spiral) SPRING SUPPORT FOR TRUCK FRAMES.

The (Spiral Box) Springs supporting the side frames relieve Truck Frames, Motors and Rail Joints from pounding, Hammer blows and prevent crystallization and breakage.

DOUBLE COMPOUND LEVER BRAKES.

The arrangement of Brake Levers is so powerful that the car can be easily controlled by the ordinary conductor hand brake and collisions and accidents prevented.

EASY ACCESS TO MOTORS.

The bolsters supporting the car body are so attached to the Elliptic springs and Truck frames that they can be easily and quickly removed (without removing a single nut) and the space occupied by them used by the motor caps or axles, which is very important, especially when two motors are used on one truck.

## GUARANTEE.

This truck is guaranteed to be superior in design, workmanship, easy riding, and economical cost of maintenance to any Double Truck in service.

For Descriptive Catalogue, Testimonials, Price List and Blue Prints, apply to:

The Peckham Motor Truck & Wheel Co.

GENERAL SALES OFFICE:

Havemeyer Building, 26 Cortlandt St., New York.

CHICAGO OFFICE: 120 N. La Salle St.

PHILADELPHIA, 420 WALNUT STREET.

SAN FRANCISCO, 120 CALIFORNIA STREET.

LONDON OFFICE: 120 VICTORIA STREET, LONDON.

23  
16

**PECKHAM'S** **EXTRA STRONG,**  
**"TRIPLE CUSHIONED,"**  
**SWING BOLSTER DOUBLE TRUCK**

NO. 15.



Designed for Extra Heavy, High Speed Interurban or Elevated or Trunk line Electric Railway Service. Weight of one Truck, 6,600 lbs.; weight of car equipment, two trucks and four G. E. 1000 motors, 22,000 lbs.

**THE PECKHAM MOTOR TRUCK & WHEEL COMPANY**  
Havemeyer Building, 28 Cortlandt Street, New York.

Boston Office,  
53 State St.

Philadelphia Office,  
420 Walnut St.

Chicago Office,  
Marquette Building.

San Francisco Office,  
123 California St.

London Office,  
31 Victoria St., Westminster.

PECKHAM



PECKHAM'S "Extra Strong" <sup>All Steel</sup> Short Wheel Base Double Truck <sup>Trade</sup> 14 B 3.

**Equipped with Centre Bearing Swing Bolster and Inside Brakes**

Erwählungsbezirk 24 u. 25. Co.

10. 7. 6. 7. 8.

*Compositum*: *Adiantum*

2 R. J. Nov 5, 1905

James



**QUARANTEED** to be the strongest, heaviest riding and best braking English Tire in use.  
Pedalside, Journal News and  
Circuit Rider magazines. Weight of new tires without motor, 5,608 pounds.

ADOPTED AS STANDARD BY  
THE LARGEST ELECTRIC RAIL-  
WAYS IN THE UNITED STATES

26 Cortlandt St.  
NEW YORK.

DAILY STREET RAILWAY REVIEW

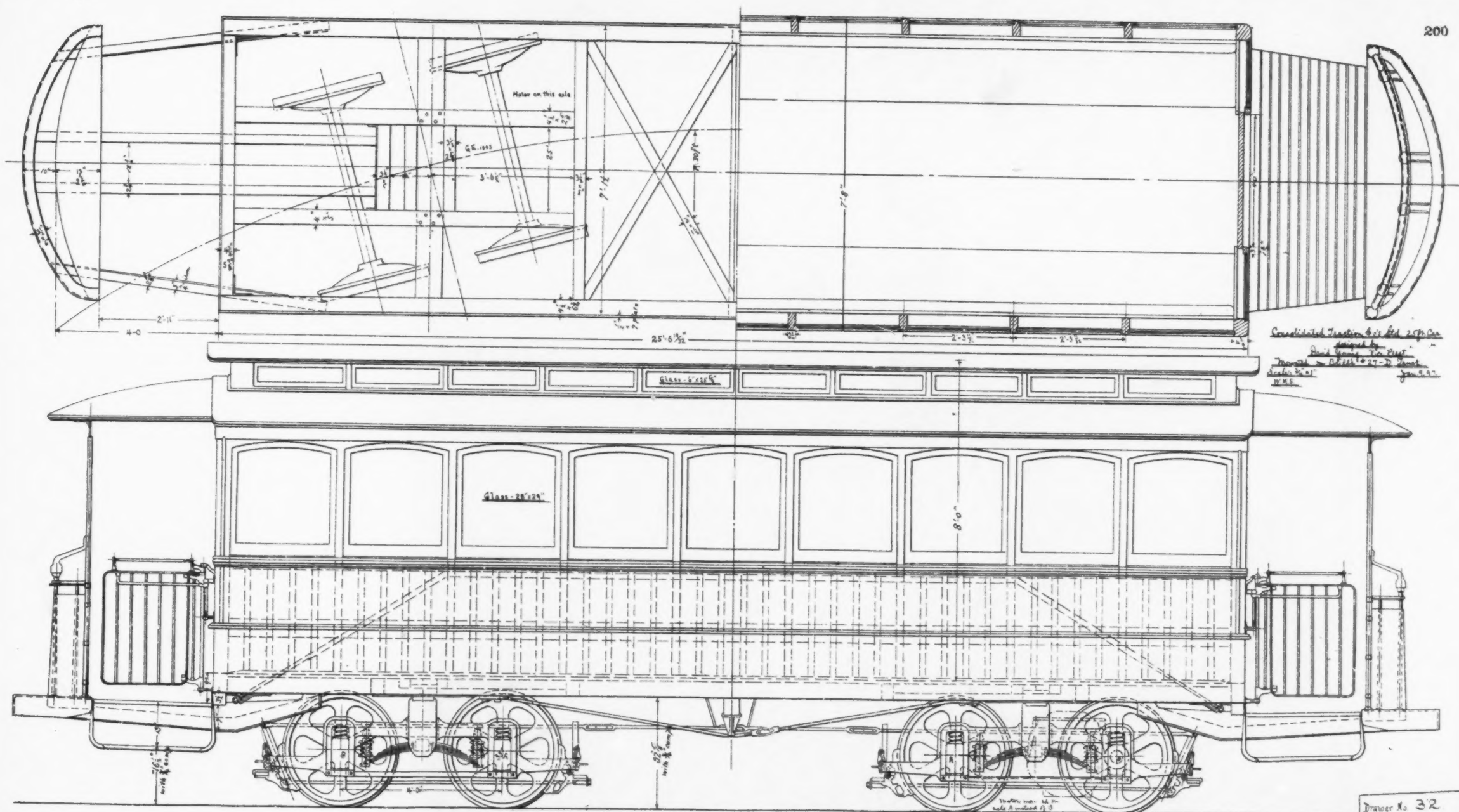
Build 1912 - 4 wheel base  
S.C. & P. Co.  
"Compliments of the  
S.C. & P. Co. Oct. 19, 1912"

PECKHAM'S-14B-3

EIGHT WHEEL BASE DOUBLE TRUCK

MANUFACTURED FOR METROPOLITAN STREET RAILWAY  
KANSAS CITY





Consolidated Traction Co. Ltd. 25th Oct  
designed by  
David Young, Tn. Plst.  
Mounted on Bells + 29-D Traction  
Scale 1/2" = 1'  
M.M.S. Jan 9.97

Drawer No. 32  
Tracing No. A 3235.

**CHART**

**TOO**

**LARGE**

**FOR**

**FILMING**

# PECKHAM CENTRE BEARING "SHORT WHEEL BASE" SWING BOLSTER DOUBLE TRUCKS

Adopted as standard by the largest Electric Railways in this country. Designed expressly for "Short Radius Curves" and to reduce height of car bodies by allowing wheels to radiate between car sills. "MOTORS SUPPORTED OUTSIDE" of axles can be more easily examined and repaired, gives greater traction, and (where two motors are used) prevents truck from twisting. "LOW DOWN ENDS" allow truck to swing under the steps of open cars.

## 14 B-6—WHEEL BASE, 4 Ft.

Designed for light and medium weight car bodies.

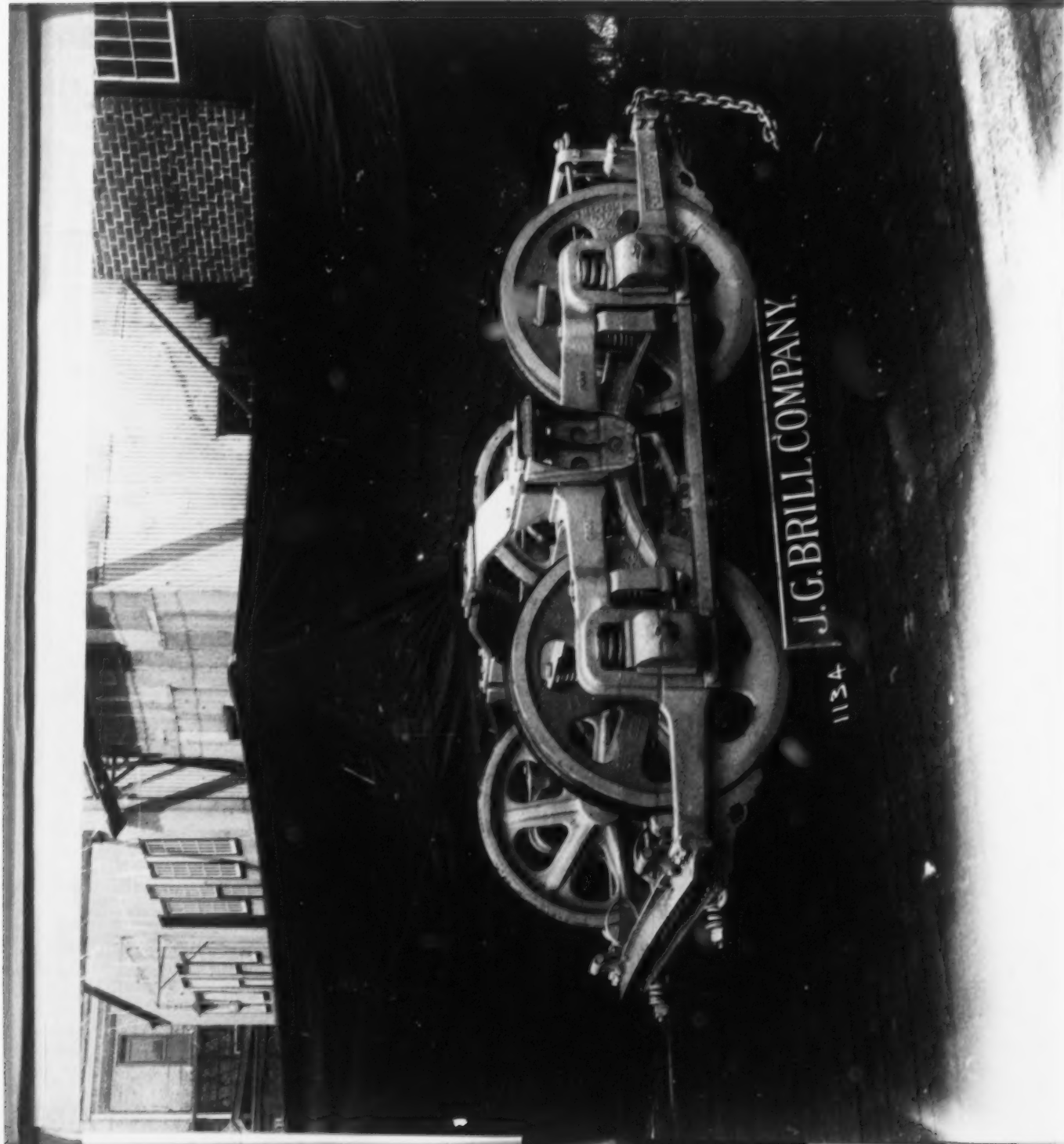


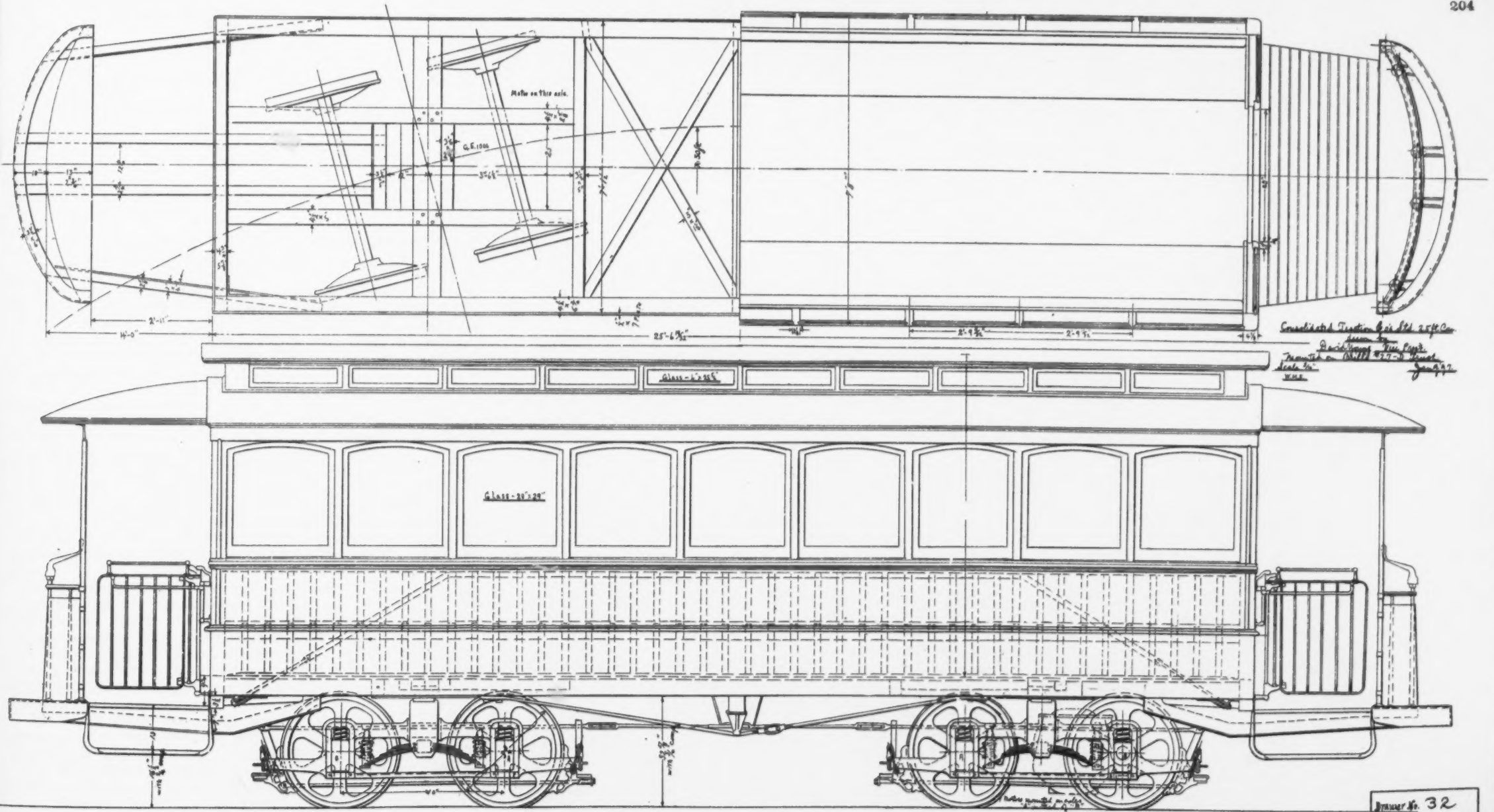
## STANDARD 14 B-3—WHEEL BASE 4 Ft. and 4 Ft. 6 in.

Designed for 40-Ft. Closed and 44-Ft. 6 in. Open cars.









DRIVER No. 32  
Tracing No. A 3295

167

Supreme Court, District of Columbia.

J. G. BRILL et al.

VS.

WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

For Identification. J. A. S., Special Examiner.

July 26, '05.

Copy.

[Canceled Revenue Stamp.]

10 cents.

*Certification of Incorporation of The Peckham Manufacturing Company.*

We, the undersigned, all being persons of full age, and at least two-thirds being citizens of the United States, and at least one of us a resident of the State of New York, desiring to form a stock corporation pursuant to the provisions of the Business Corporation Law of the State of New York, do hereby make, sign, acknowledge and file this certificate for that purpose as follows:

*First.* The name of the proposed corporation is The Peckham Manufacturing Company.

*Second.* The purposes for which it is to be formed are: To manufacture, purchase or otherwise acquire, sell, lease or otherwise dispose of cars, carriages, vehicles, automobiles, or parts of the same, bodies, trucks, wheels, frames or snow plows for operation on highways, railways or street railways propelled by steam, cable, electricity, liquid or compressed air, hot water or other motive power. To manufacture, buy, sell, deal in and deal with all articles, appliances and attachments incident to or connected with such cars, carriages, vehicles, automobiles, or the like, and machinery for making the same.

To manufacture, buy or otherwise acquire, operate, sell, lease or otherwise dispose of momentum, friction, air electric magnetic or other brakes, rotary and other forms of snow plows for roads or railway carriages, and generally to engage in the manufacture of any and all kinds of articles, machinery and appliances from steel, iron or other suitable materials, or to do any other acts of things which may be necessary, proper or convenient in the conduct of the business aforesaid or any part thereof.

To manufacture, buy, sell, deal in and deal with motors, dynamos, motor dynamos, dynamo electric machinery, machinery implements and appliances for generating, converting, reducing, distributing, controlling, applying, using and employing  
168 electricity, or any like force or form of energy for power, lighting, heating, chemical work, cooking, refrigerating, or for any other purposes.



To construct, maintain and operate works for the manufacture, accumulation, supply and distribution of electricity or other like force or form of energy for lighting, heating, power, chemistry, cooking, refrigerating and for each and every other purpose for which the same may be useful, convenient, available or necessary.

Apply for, obtain, register, purchase or otherwise acquire and hold, own, use, operate, introduce and sell, assign or otherwise dispose of any and all trade marks, formulæ, secret processes, trade names and distinctive marks, and all inventions, improvements and processes used in connection with or secured under letters patent or otherwise of the United States, or of any other country, and any governmental grants or concessions; and use, exercise, develop, grant licenses in respect of or otherwise turn to account any and all such trade marks, patents, licenses, concessions, processes and the like, or any such property, rights and information acquired.

Also, the further right to purchase or otherwise acquire the property, franchises and good will of other corporations or individuals, and to purchase, acquire, hold and dispose of the stocks, bonds and other evidences of indebtedness of any corporation, domestic or foreign, in conformity with section 40 of the Stock Corporation Law of the State of New York.

In addition to the foregoing purposes and objects, this corporation is organized for the further purpose of acquiring the property, rights, franchises and business of the Peckham Motor Truck and Wheel Company, a corporation duly organized and existing under the laws of the State of New York, and engaged in the same or a similar character of business to that which is to be conducted by this corporation.

*Third.* The amount of the capital stock is five hundred thousand dollars (\$500,000), divided into five thousand (5000) shares of the par value of one hundred dollars (\$100) each. Of said stock two thousand five hundred (2500) shares shall be preferred stock, and the balance, two thousand five hundred (2500) shares, shall be common stock. Said preferred stock may be issued as and when the board of directors shall determine, and shall entitle the holder thereof to receive out of the net earnings and the corporation shall be bound to pay, a fixed cumulative dividend at the rate of but not exceeding 7 per cent. per annum, payable semi-annually on the first days of January and July in each year; provided, however, that whenever a dividend is paid on the preferred stock, the directors shall have the power in their discretion to declare and pay a dividend for a like period on the common stock. The holders of preferred and common stock shall have equal voting power. The holders of preferred stock shall, in case of liquidation or dissolution of the corporation, before any amount shall be paid to the holders of the general or common stock, be entitled to be paid in full the par value of their preferred shares before any amount shall be set apart or paid to the holders of the common stock.

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*Fourth.* The number of shares of which the capital stock shall consist is five thousand (5000) of the par value of one

hundred dollars (\$100) each, and the amount of capital with which the said corporation will begin business is one thousand dollars (\$1000).

*Fifth.* Its principal business office is to be located in the city of Kingston, in the county of Ulster.

*Sixth.* The duration is to be ninety-nine years.

*Seventh.* The number of its directors is to be seven.

*Eighth.* The names and post office addresses of the directors for the first year are as follows:

Name.	Post Office address.
James H. Everett,	Kingston, New York.
Virgil B. Van Wagonen,	Kingston, New York.
Hewitt Boice,	Kingston, New York.
Frank M. Jeffery,	26 Cortlandt St., New York City, N. Y.
George H. Bowers,	26 Cortlandt St., New York City, N. Y.
William E. Davis,	85 John St., New York City, N. Y.
William Wampler,	26 Cortlandt St., New York City, N. Y.

*Ninth.* The names and post office addresses of the incorporators and a statement of the number of shares of stock which each agrees to take in the corporation are as follows:

Name.	Post Office address.	No. of shares.
James H. Everett,	Kingston, New York,	10
Virgil B. Van Wagonen,	Kingston, New York,	1
Hewitt Boice,	Kingston, New York,	40
Frank M. Jeffery,	26 Cortlandt St., New York City,	2
George H. Bowers,	26 Cortlandt St., New York City,	1
William E. Davis,	85 John St., New York City,	1
William Wampler,	26 Cortlandt St., New York City,	1

In witness whereof, we have made, signed, acknowledged and filed this certificate in duplicate.

Dated the twentieth day of ——— nineteen hundred.

JAMES H. EVERETT.  
 VIRGIL B. VAN WAGONEN.  
 GEORGE H. BOWERS.  
 WM. M. WAMPLER.  
 FRANK M. JEFFERY.  
 WM. E. DAVIS.  
 HEWITT BOICE.

STATE OF NEW YORK,  
 County of Ulster, ss:

On this 28th day of August, nineteen hundred, before me came Virgil B. Van Wagonen and James H. Everett and Hewitt Boice, to me personally known to be the persons described in and who made and signed the foregoing certificate, and severally duly acknowl-

edged to me that they made, signed and executed the same for the uses and purposes therein set forth.

H. R. DE WITT,  
*Notary Public.*

170 STATE OF NEW YORK,  
*Ulster County, Clerk's Office, ss:*

I, William T. Broadhead, Clerk of the County of Ulster and also Clerk of the Supreme Court, in and for said County, being a Court of Record, do hereby certify that H. R. De Witt whose name is subscribed to the certificate of the proof or acknowledgment of the annexed instrument and thereon written, was at the time of taking such proof and acknowledgment a Notary Public in and for said County, duly commissioned and sworn and authorized by the laws of said State to take the acknowledgment and proofs of deeds or conveyances for lands, tenements or hereditaments in said State. And further that I am well acquainted with the handwriting of such Notary and verily believe that the signature to said certificate of proof or acknowledgment is genuine.

In testimony whereof, I have hereunto set my hand and affixed the seal of said Court and County, the 28th day of August, 1900.

[SEAL.]

WM. T. BROADHEAD,  
*Clerk of Ulster County.*

[Canceled Revenue Stamp.]  
10 cents.

STATE OF NEW YORK,  
*County of New York, ss:*

On this 24th day of August, nineteen hundred, before me came William E. Davis, George H. Bowers and William M. Wampler and Frank M. Jeffery, to me personally known to be the persons described in and who made and signed the foregoing Certificate, and severally duly acknowledged to me that they made, signed and executed the same for the uses and purposes therein set forth.

[SEAL.]

ROBERT C. MARONEY,  
*Notary Public (113), N. Y. Co.*

STATE OF NEW YORK,  
*County of New York, ss:*

I, William Sohmer, Clerk of the County of New York, and also Clerk of the Supreme Court for the said County, the same being a Court of Record, do hereby certify, that Robert C. Maroney, whose name is subscribed to the Certificate of the proof or acknowledgment of the annexed instrument, and thereon written, was, at the time of taking such proof or acknowledgment, a Notary Public in and for the County of New York, dwelling in the said County, commissioned and sworn, and duly authorized to take the same. And further, that I am well acquainted with the handwriting of such Notary,

and verily believe that the signature to the said certificate of proof or acknowledgment is genuine.

In Testimony Whereof, I have hereunto set my hand and affixed the seal of the said Court and County, the twenty-fifth day of August, nineteen hundred.

[SEAL.]

WILLIAM SOHMER, *Clerk.*

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(Endorsed.)

*Certificate of Incorporation of The Peckham Manufacturing Company.*

Tax for privilege of organization of this Corporation, \$625. Under Chapter 908, Laws of 1896, paid to State Treasurer before filing.

STATE OF NEW YORK,  
OFFICE OF SECRETARY OF STATE.

Filed and recorded August 29, 1900.

J. B. H. MONGIN,  
*Deputy Secretary of State.*

STATE OF NEW YORK,  
*Office of the Secretary of State, ss:*

I have compared the preceding with the original Certificate of Incorporation of The Peckham Manufacturing Company, filed and recorded in this office on the twenty-ninth day of August, nineteen hundred, and do hereby certify the same to be a correct transcript therefrom and of the whole of said original.

Witness my hand and the Seal of Office of the Secretary of State, at the City of Albany, this eighth day of October, one thousand nine hundred.

[SEAL.]

J. B. H. MONGIN,  
*Deputy Secretary of State.*

[Canceled 10c. Revenue Stamp.]

BRILL et al.

vs.

WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

"COMPLAINANTS' EXHIBIT UEBELACKER PATENT ASSIGNMENT."

July 26, 1905.

J. A. S., Special Examiner.

2-391.

DEPARTMENT OF THE INTERIOR,  
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify, That the annexed is a true copy from the records of this office of an instrument of writing executed by

Charles F. Uebelacker, August 4, 1897.

Recorded October 25, 1897, Liber O-56, page 125.

Said record has been carefully compared with the original and is a correct transcript of the whole thereof.

172 In testimony whereof, I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the city of Washington this twenty-fifth day of July, in the year of our Lord one thousand nine hundred and five, and of the independence of the United States of America the one hundred and thirtieth.

E. B. MOORE,

[SEAL.]

*Acting Commissioner of Patents.*

Liber O-56.

Page 125.

*Assignment.*

Whereas, I, Charles F. Uebelacker, of Kingston, Ulster County, State of New York, have invented certain new and useful improvements in car trucks, for which I am about to make application for letters patent of the United States; and whereas The Peckham Motor Truck and Wheel Company, of Kingston, State of New York, is desirous of acquiring the entire interest in said invention and in the letters patent to be obtained therefor:

Now, therefore, Be it known that, for and in consideration of the sum of one dollar and other valuable considerations to me in hand paid, the receipt of which being hereby acknowledged, I, the said Charles F. Uebelacker, have sold, assigned and transferred unto the said The Peckham Motor Truck and Wheel Company, and by these presents do sell, assign and transfer unto said company the full and exclusive right to the said invention, as fully set forth and

*"improvement about 1895  
not 1895, please!"*

# DECKHAM'S TRUCKS

ALL SPAN  
STEEL  
MACHINE  
FITTED

AWARDED THE HIGHEST MEDAL AT THE WORLD'S FAIR  
FOR SUPERIORITY OF CONSTRUCTION.

"STANDARD" - - - TRADE MARK 60

Designed Expressly for 12 ft. Closed or 14 ft. Open Cars.



"EXTRA LONG" - - - TRADE MARK

Designed Expressly for 12 ft. Closed or 14 to 16 ft. Open Buses or Cars.



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# WHY Peckham's "Cantilever Extension" Trucks ARE SUPERIOR TO OTHER TRUCKS.

1st. Because THEIR "CANTILEVER BRIDGE TRUES" CONSTRUCTION gives the greatest strength with the least weight of metal.

2d. Because they are machine made. All bearings and bolts being machine fitted, rivets machine driven and wheels machined perfectly round.

3d. Because the side frames of the Truck are supported upon Spiral Springs, and are thereby relieved from all jars and shocks in crossing switches and turnouts.

4th. Because the Elliptic and Spiral Springs supporting the car bodies are so arranged as to give an easy riding car, whether light or heavily loaded.

5th. Because they have the Strongest, Simplest and most Effectual Brake in use.

6th. Because they are positively NON-OSCILLATING, NOISE-LESS and easy riding whether light or heavily loaded.

7th. Because being MACHINE FITTED there is NO CHANCE FOR LOST MOTION, and consequently NO REPAIRS, cost of maintenance being reduced to actual wear of brake shoes and wheels.

8th. Because they have GREATER TRACTION and consequently require LESS POWER than any other truck.

9th. Because being flexibly supported they relieve rail joints, reduce cost of track maintenance, and prolong life of car bodies.

For Descriptive Catalogue, Testimonials, Price List and Blue Prints, apply to

## The Peckham Motor Truck & Wheel Co.

GENERAL SALES OFFICE:

Havemeyer Building, 26 Cortlandt St., New York.

BOSTON, 53 State Street.

CHICAGO, Monednock Building.

PHILADELPHIA, 420 Walnut Street.

SAN FRANCISCO, 123 California Street.

PITTSBURGH, 719 Hamilton Building.

ADOPTED AS STANDARD BY THE LARGEST ELECTRIC AND CABLE RAILWAYS  
IN THE UNITED STATES.



# WHAT SOME OF THE LARGE ELECTRIC RAILWAY COMPANIES SAY ABOUT

## Peckham's "Machine Fitted" Cantilever Extension Trucks.

"We have over one thousand (1,000) Peckham Trucks in use under our 30 ft. closed and 28 and 30 ft. open cars, having adopted them as our standard after a thorough test in comparison with other makes. They are the most riding and cheapest to maintain of any trucks we have ever used, besides being very easy upon our track."

DANIEL F. LEWIS, President,  
Brooklyn Heights Railway Co., Brooklyn, N. Y.

"We have over two hundred (200) Peckham Trucks in use. They are giving us excellent satisfaction both as to easy riding, freedom from oscillation and cost of maintenance. I consider them by far the best for use on our line."

BENJ. WORTON, President,  
Atlantic Avenue T. Co., Brooklyn, N. Y.

"We have in use over three hundred (300) Peckham Trucks under our closed and open cars. They are giving us entire satisfaction in every way. We have adopted them as our standard after a thorough trial in comparison with other makes."

DAVID YOUNG, Vice Pres. and Genl. Manager,  
Consolidated Traction Co., Jersey City, N. J.

"We have been using the Peckham Truck exclusively on our road the past two years, having over one hundred (100) of them in service. Our cars ride easily and free from oscillation. We have not had one broken truck (outside of wheels, axles and brake shoes) in the two years since we have had them in service."

E. A. MAHER, President,  
Tenth Avenue Co., 10th Street Ave., New York City.

"We have 10 Peckham trucks that carry our load and they are very good. We have 10 Peckham trucks that carry our load and they are very good. We have 10 Peckham trucks that carry our load and they are very good."

W. B. WATSON, General Manager,  
People's Traction Co., Philadelphia, Pa.

"The trucks we have used since the incorporation of our road have been of the Peckham type. They are the best we have ever used. They are the best we have ever used. They are the best we have ever used."

WILLIAM A. WATSON, President,  
New York City Traction Co., New York City.

"We are very much pleased with the Peckham trucks. They are the best we have ever used. They are the best we have ever used. They are the best we have ever used."

W. B. WATSON, General Manager,  
Peckham Traction Co., New York City.

Over 3,000 Peckham Trucks in Use on various Roads.

DARK PAGE

described in the specification prepared and executed by me on the 4th day of August, 1897, preparatory to obtaining letters patent of the United States therefor; and I do hereby authorize and request the Commissioner of Patents to issue the said letters patent to the said The Peckham Motor Truck and Wheel Company as the Assignee of my entire right, title and interest in and to the same, for the sole use and behoof of the said The Peckham Motor Truck and Wheel Company and its successors and assigns.

[SEAL.]

CHARLES F. UEBELACKER.

Signed at New York, N. Y., August 4, 1897. In the presence of J. E. M. Bowen.

STATE OF NEW YORK,  
*City and County of New York, ss:*

On the 4th day of August, 1897, before me personally appeared Charles F. Uebelacker to me known, and known to me to be the same person described in and who executed the within assignment, and he acknowledged to me that he executed the same.

[NOTARIAL SEAL.]

C. L. MALCOLM,  
*Notary Public, Kings County, N. Y.*

Certificate filed in New York County.  
Recorded Oct. 25, 1897.

(Here follow diagrams marked pp. 173 to 176.)

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*Deposition on Behalf of Defendant.*

Filed March 14, 1906.

Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
against

THE WASHINGTON RAILWAY &amp; ELECTRIC COMPANY, Defendant.

NEW YORK, May 15th, 1905.

Testimony taken and proceedings had on behalf of defendant, pursuant to notice, before John A. Shields, Esq., United States Commissioner, at the office of Warfield & Duell, solicitors for defendant, No. 220 Broadway, New York, commencing Monday, May 15th, 1905, at 11:00 A. M.

## Present:

Joseph L. Levy, Counsel for Complainants.  
Warfield & Duell, Counsel for Defendant.

JOSEPH H. FREEMAN, a witness produced on behalf of the defendant, having been first duly cautioned and sworn, in answer to interrogatories propounded to him by counsel for defendant, testifies as follows:

Q 1. Please state your name, age, residence and occupation?

A. Joseph H. Freeman, 37, Brooklyn, New York, consulting engineer, mechanical expert and solicitor of patents.

Q. 2. What experience have you had tending to qualify you to testify as mechanical expert in this cause?

A. I studied the principles and theories of mechanic arts and sciences in the mechanical department of the Michigan Agricultural College from which institution I received the degree of Bachelor of Science.

As a practical training in mechanical matters, I have had about ten years' experience in actual machine shop work including the designing, constructing, assembling and testing of machines of various kinds, and the handling and superintendence of machinery in practical operation.

For the past fourteen years, a large part of which time I was a member of the Examining Corps of the United States Patent Office, my time and attention have been constantly given to the study and comparison of mechanical devices and methods, as disclosed in the drawings and descriptions and claims of patents, and in the illustrations and descriptions of other publications.

I have also prepared the descriptions and claims for a great many inventions in various arts and have been called upon to give my

178 opinion as to the operativeness and novelty of mechanical devices and methods and to testify as an expert in such matters in cases pending before the United States Courts.

Q. 3. Have you read and do you understand Letters Patents in suit No. 627,898 and No. 627,900 to G. M. Brill, dated June 27, 1899?

A. I have and do.

Q. 4. Please consider these Letters Patents in connection with the prior art, and in accordance with the statement of complainants' counsel at the end of X Q. 20 of the testimony in complainants' *prima facie* case, that only claims 13 and 81 of Letters Patent No. 627,898 and claims 13, 14, 15 and 17 of Letters Patent No. 627,900 will be relied upon. You may confine your attention to the subject-matter of those claims. You may also refer to any models or other matter which you think will aid you in presenting this matter to the Court?

A. The constructions of the two patents in suit refer to an old and well-known type of truck or running gear for railway cars, and particularly for passenger carrying cars, the same being known as pivotal swing bolster trucks. The general features of this type of running gear are the wheels, usually four in number, rigidly mounted on a pair of axles; a rectangular frame having side-bars located outside of the wheel gauge and resting on the journals of the wheel axles through the intervention of suitable journal boxes, and usually also springs located between the journal boxes and the side frames; a bolster arranged transversely of the truck frame and having near its center a pivotal connection with the car body; and connections between the bolster and the truck frame including springs and links, whereby the bolster is resiliently supported from the truck frame and at the same time permitted to move transversely of the truck frame a limited distance and with a graduated resistance as required to lessen the shock or jar or jerk which would otherwise be transmitted from the truck to the car body when the truck is subjected to sudden sidewise motion owing to irregularity of the rails, curves in the track, &c.

The devices shown and described in each of these two patents relate particularly to the connections between the bolster and the truck frame, so far at least, as the subject-matter of the claims inquired about, are concerned.

In accordance with the construction illustrated in the drawings of patent No. 627,898 and specifically described, the truck frame comprises side frames having a longitudinal bar 5, yokes or pedestals 2, in which the axle boxes 9 are guided, a lower longitudinal bar 13 connecting the lower ends of the yokes 2, and transverse bars 8 and 71, the latter being located near the longitudinal center of the truck between the bars 5 of the side frames as shown in dotted lines in Fig. 1 and in Figs. 5 and 6, the same being numbered only in Fig. 5. These bars 71 are commonly termed "transoms" and in addition to serving as a connection between the opposite side frames of the truck they form as is usual with this type of truck, a guide or housing for the bolster.

The particular form of bolster shown in this patent consists of a transverse member embodying upper and lower bars 67 and 23 re-

179 spectively (see Fig. 5) extending from one side of the truck to the other, and having at its center a bearing 69 on which the body of the car is pivotally mounted.

The connections between the bolster and the truck frame comprises a pair of longitudinally extending semi-elliptic springs 21, one of which is secured to the under side of each end of the bolster and arranged with its free ends pointing downwardly and extending to substantially equal distances on opposite sides of the bolster, substantially in the plane of the corresponding side frame, and between the upper and lower bars thereof. The free ends of each of the semi-elliptic springs are connected to the upper bar 5 of the corresponding side frame at points near the axle box yokes 2 by means of links which are flexibly connected with the said bar so that they have unrestricted movement in two directions, one transversely of the truck frame so as to provide for the usual transverse movement of the bolster with reference to the truck frame and another longitudinally of the truck frame to provide for the end motion or end play of the semi-elliptic springs due to their flexure under the load. These links moreover are made up of two parts capable of relative longitudinal movement with an interposed spiral spring so that the springs form a yielding and resilient or extensible spring connection between the semi-elliptic spring equalizers 21 and the frame of the truck. As clearly shown in Fig. 2 of the patent, each of the said links comprises a bolt 28 having a ball socket or universal joint connection with the side bar 5 and carrying at its lower end removable nuts 32 and a spring supporting cup or washer 33; a strap or hanger 36, the upper transverse bar 38 of which is perforated to receive the bolt 28 and the lower bar 39 of which is slotted transversely to receive the downturned lip 42 of the end of the spring 21; and the spiral spring 34 arranged between the cup 33 on the lower end of the bolt 28 and a cup 35 beneath the upper cross bar 38 of the strap or hanger 36, said spring by its compression giving the link its capability of elastic extension.

#### Recess.

This is all of the construction shown in the patent that it is necessary to consider so far as the subject-matter of the claims inquired about is concerned.

Claim 13 is expressed in the following language:

"13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described."

Claim 81 reads as follows:

"81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described."

Each of these claims is directed to the connections between the



180 bolster and the side frames which form characteristic elements of the ordinary swing bolster pivotal truck. In Claim 13 the connections are defined as "semi-elliptic springs movably and resiliently suspended from the side frames." In Claim 81 the connections between the semi-elliptic springs and the side frames are more specifically defined as "links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames." Claim 81 however is more generic in its terms than is Claim 13 in that it contains no reference to the flexible or movable feature of the connections between the bolster and the side frames which in the construction shown is provided by the universal joint between the upper ends of the links and the bars 5 of the side frames.

These claims were evidently intended to and do cover broadly the provision in a swing bolster truck of semi-elliptic spring connections between the bolster and the side frames of the truck and some kind of a resilient or elastic connection between the semi-elliptic springs and the said frames which elastic connections, according to Claim 13, provide for movement of the semi-elliptic springs in relation to the truck frame and, according to Claim 81, are in the form of "links, and springs combined with said links."

The location of these spring connections between the bolster and the truck frame, relative to other parts of the truck, are immaterial so far as the subject-matter of these claims is concerned. This is clear from the statements in the description to which each of the claims makes a specific reference and also from the fact that other claims are drawn to cover the particular location of the parts.

In describing the location of the springs, the patentee says:

"These springs are supported or hung from the truck frame, specifically from the side bars 5, such support being such as to allow of a transverse swing of the springs and truck-bolster in unison and also of a longitudinal swing of the supports to allow of the lengthening out of the spring when under compression."

The words "specifically from the side bars 5" appearing in this statement clearly indicates that the patentee did not intend to confine himself to the specific location shown in the drawings, especially in view of the fact that the specific location of the connections shown is made the subject-matter, in part at least of other claims. See for example Claim 16 and Claim 52.

The patentee moreover makes the following specific disclaimer of the particular location of these spring connections which is shown in the drawings:

"The location of the semi-elliptic springs outside of the wheel gauge on each side of the truck, together with the location of the links for supporting the semi-elliptics closely adjacent to the axle boxes, and the swinging of the said springs from the truck frame from such points gives a better support for the car body than does the usual link hung bolster supported from the truck transoms within the wheel gauge. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the third day of November, 1896, serial number 610,902 and therefore I do not claim the same herein."



181 The application referred to in this disclaimer, it appears, eventuated in two patents; to wit: No. 610,118 dated August 30, 1898, and No. 610,119 of the same date, the latter being issued upon an application divided out of the application referred to in the disclaimer. Each of these Brill & Curwen patents shows a truck of the *same* type as that illustrated in the patents in suit and of the same construction except as to the specific connections between the extensible elastic links and the truck bolster. In the Brill & Curwen patents a relatively rigid or inflexible equalizer bar is used in place of the equalizing semi-elliptic spring of the patents in suit and a number of full elliptic springs are arranged between the relatively rigid equalizer bar and the car bolster to provide the desired elasticity. The relatively rigid equalizer bar of the Brill & Curwen patents is located below the upper bar of the truck side frames and the extensible spring links which connect the bar with the side frames are connected directly to the upper bar of the side frames at points adjacent to the pedestals or housings for the journal bearings.

It thus appears that the subject-matter of Claims 13 and 81 of the patent in suit No. 627,898 consists in the provision between a truck bolster and a truck frame of a particular spring connection. According to Claim 13 this connection comprises semi-elliptic springs secured to the bolster and movable and resilient connections between the semi-elliptic springs and the truck frames. According to Claim 81 these connections comprise semi-elliptic springs upon which the bolster rests and connections between the ends of the semi-elliptic springs and the truck frames consisting of links and springs combined with the links.

Brill was not the first however to provide a spring connection such as that set forth in either of these claims between a truck frame and the vehicle body supported thereon. In the English patent to Spencer and Stidolph, No. 2230 of 1876, I find substantially the same co-operative relationship between a semi-elliptic spring and a movable and resilient connection therefor, said connection being specifically in the form of a link and a spring combined with said link as that set forth and claimed in the patent in suit.

This English patent relates to "Improvements in Bearing Springs for Carriages, Trucks, and Locomotive Engines for Railway, Tramway and Common Roads," said improvements consisting in

"applying a pad or pads of Indian rubber or other suitable elastic material at the two ends of the laminated steel bearing springs of carriages, trucks, or locomotive engines used on railways, tramways or common roads to absorb the shocks which the bearing springs sustain from the road or wheels not being true in line or form."

The laminated spring here referred to, only one end of which is shown in the drawing, is evidently the same character of spring as the semi-elliptic springs shown and described and referred to in the claims of the patent in suit. The resilient connections for the ends of this spring differ in construction from the specific form of resilient connections shown and specifically described in the patent in  
182 suit, but the resilient connections of this English patent clearly come within the terms of each of the claims in ques-

tion and clearly constitute embodiments of the corresponding features of the claims, if said claims are to be understood as including within their terms the particular form of elastic connections employed in the defendant's truck, as will more fully appear when I come to consider that construction. The particular elastic connection shown in the English patent comprises a pin or bolt pivoted to the end of the semi-elliptic spring and having at its other end a nut and washer between which washer and a projection from the body to which the connection is made, is confined under compression a spring B specifically in the form of a rubber ring surrounding the bolt. The bolt passes loosely through an opening in the part A to which it connects the semi-elliptic spring, so as to provide for the desired lateral movement of the semi-elliptic spring with reference to the body with which it is connected.

In this connection the patentees of the English patent make the following statement:

"One object of these improvements is to give a better lateral action to the carriage body. To effect this, the spring pin may be left somewhat free in its hole D; the hole E in the supporting bracket may be made conical, *or spherical surfaces may be used to effect the same object.*" (Page 2, lines 27 to 31, italics mine.)

I observe that this English patent does not specifically show or describe a pivotal swing bolster truck and that the drawings indicate that in the particular embodiment illustrated of the spring connections forming the subject matter of the patent, the spring and link connection is intended to be connected to the body of the vehicle and the semi-elliptic spring connected to the truck. There is no point made in the description of the particular arrangement and it is obvious that the associated elliptic spring and elastic connection might be arranged in the reverse order, or that these parts might be substituted for corresponding parts in any existing construction as for example in the construction shown in the patents to Brill & Curwen before referred to.

This English patent however is only one among many examples to be found in the constructions of the prior art wherein semi-elliptic springs are employed in connection with elastic or resilient end supports and elastic or resilient end supports which provide for a relative movement and a free relative movement in more than one direction between the semi-elliptic springs and the part to which it is connected, and with elastic or resilient end supports or connections in the form of links combined with springs.

Adjourned to Tuesday, May 16th, 10:30 A. M.

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TUESDAY, May 16—10:30 a. m.

Same place.

Appearances as before.

The witness continues his answer to question 4:

U. S. Patent to Graham 503,044 shows semi-elliptic springs and resilient connections arranged between the ends of the springs and the body supported thereby. In this case, the semi-elliptic springs

rest on the journal boxes of a car truck and are connected at their opposite ends to the car body through the truck frame by elastic connections specifically in the form of rods or bolts and spiral springs, these elastic connections differing from those shown in the English patent to Spencer & Stidolph only in that spiral springs are used in place of rubber rings.

It is obvious that the general construction and operative relationship of the parts shown in these two patents are the same as the construction of the patent in suit and any one at all familiar with mechanical matters will at once perceive that if semi-elliptic springs and resilient connection for the ends thereof can be used as shown in the patents to Spencer and Stidolph and Graham they could also be used in the manner shown in the patent in suit.

Brill was not the first however to use semi-elliptic springs and resilient end connections therefor between the bolster and frame of a pivotal swing bolster car truck as set forth in Claims 13 and 81 of his first patent.

U. S. Patent to Buck No. 112,897 dated March 21, 1871, shows a swing bolster pivotal car truck having substantially the same elements arranged in substantially the same operative relationship as the construction shown and described and specified in Claims 13 and 81 of the first Brill patent. This Buck patent shows a four-wheeled car truck having a truck frame including side bars AB and cross bars or girders CC', DD', EE', the latter forming transoms between which a transverse bolster N is located said bolster having a central pivot bearing and end bearings forming the usual connections for one end of the car body. The spring connections between this bolster and the truck frame correspond substantially with the spring connections between the bolster and truck frame as disclosed and claimed in the patent in suit. The spring connections of the Buck construction include longitudinally arranged semi-elliptic equalizer springs substantially identical with the semi-elliptic equalizer springs 21 of the Brill construction said springs being secured to the opposite ends of the bolster and to the under sides of the bolster with their ends pointing in the opposite directions and downwardly in the same way as the springs 21 of the Brill construction are secured and arranged. The ends of the semi-elliptic equalizer springs O, P, are connected to the truck frame by pivoted and jointed links or shackles o, p, q, r, which in turn are connected to and are combined with springs Q R, in the form of semi-elliptic springs rigidly connected at their central points with the transverse bars D D' of the truck frame. These links and springs of the Buck construction correspond exactly, in operative relationship and in function or result,  
 184 with the spring links or movable and resilient connections, or links combined with springs, of the Brill construction.

I observe that the movably and resiliently supported semi-elliptic equalizer bars which carry the swing bolster of the Buck construction derive their support from the side bars of the truck frame indirectly through the transverse bars D D' of the truck frame, instead of being more directly connected to said side bars as in the particular construction illustrated in the Brill patent. This difference however is entirely immaterial so far as the subject-matter of the claims

are concerned. Neither of the claims is limited to a direct connection of the springs or of the resilient supports for the springs with the side bars or side frames of the truck. Claim 13 specifies that the semi-elliptic springs are "movably and resiliently suspended from the side frames," and Claim 81 specifies that the links derive "their support from the side frames." The semi-elliptic bolster carrying springs O P of the Buck construction are "movably and resiliently suspended from the side frames" of the truck, and the links of the Buck construction derive "their support from the side frames" of the truck. The language of the claims applies as directly and as accurately to the Buck construction as it does to the Brill construction and as applied to the Buck construction the meaning of the language is the same as when applied to the Brill construction.

The drawings of this Buck patent are a little difficult to read, owing to the fact that no side view of the truck is given. The construction is clearly described in the specifications, however, and can be readily understood from the drawings by anyone familiar with the art and accustomed to reading drawings. In order that the Court may readily understand this Buck construction a model of the same has been prepared. This model I have before me and I observe that it is built in substantial accordance with the disclosure of the Buck patent and accurately represents the same and especially the spring connections between the bolster and the truck frame, with the exception that the equalizer springs which support the bolster are arranged slightly nearer to each other than they are shown in the patent drawings. As shown in the patent drawings these springs are arranged in substantial alignment with the wheel gauge, whereas in the model they are arranged slightly within the wheel gauge. So far as the principle of the construction is concerned, this slight discrepancy between the drawings of the patent and the model is wholly immaterial. There is no point made in the patent as to the relative location of the equalizer springs. The only description as to this feature is that the springs O P are "near the ends" of the bolster. Obviously it is within the province of the mechanic skilled in the construction of car trucks to locate these springs where in his opinion they will be the most effective for the purpose intended.

Not only does this Buck construction meet the substance and the terms of the claims in question, but its described objects and functions are substantially the same as those attributed to the Brill construction. The patentee says:

185 "The object is to give an easy and durable *combined spring and swing motion*, and to bring the bearing (load) directly over the springs of the equalizer bar, so that there shall be no tendency to warp or strain the frame of the truck." Page 1, 3rd paragraph, italics mine.)

The patentee says further:

"My invention consists in the firm attachment, beneath the ends of the bolster, of *springs extending across at right angles to the bolster, and whose ends are connected by shackles to the ends of springs* suspended from the intermediate cross-ties of the truck." (Page 1, 2nd paragraph, italics mine.)

After describing the particular construction shown in the drawings, the patentee says:

"The bolster has constant and free capacity for swing motion on the shackle connections with the springs and spring motion on the springs O P and the equalizer springs G." (Page 1, 2nd column, 3rd paragraph.)

And as an advantage of the construction he says:

"With my truck, as before described, the bearings of the car-body on the frame of the truck are placed *near to the wheels* and directly upon the tie-bar over the equalizer springs, so that there is no injurious strain." (Paragraph beginning bottom of 2nd column, page 1, italics mine.)

The equalizer springs here referred to and the equalizer bar referred to in the paragraph first above quoted, form the connection between the truck frame and the journal boxes in the particular construction illustrated in the Buck patent. As clearly represented in the model the side frames of the Buck truck are provided with the usual yokes or pedestals in which the journal bearings are guided and these yokes or pedestals are connected by upper and lower bars, substantially as in the Brill construction and in accordance with the common practice in car truck construction. Instead of arranging spiral or rubber springs directly between the boxes and the tops of the yokes or pedestals as illustrated in the Brill patent, a feature of common construction, another old and well known method of connecting the truck frame with the journal boxes was adopted in the particular truck illustrated in the Buck patent. This connection consists of a longitudinal equalizer bar shown in section in Fig. 2 of the patent and lettered I, is arranged with its ends resting on the tops of the two journal boxes at one side of the truck and between this equalizer bar and the top bar of the side frame are arranged two rubber compression springs lettered G in the drawings. Obviously the old method of supporting the truck frame from the journals adopted by Brill could be adopted in the Buck construction, without the exercise of anything more than the mere choice of one of two old and common features of truck construction. With this change in the Buck construction, the semi-elliptic bolster carrying equalizer springs of that construction could just as readily be placed outside of the wheel gauge and between the upper and lower bars of the side frames, exactly as the equalizer springs of the Brill construction are arranged, and the springs which support the pivotal

link connections for the ends of the equalizer springs could  
186 be mounted upon the side frames of the truck directly instead of indirectly. In fact these very changes are suggested by other patents found in the prior art. See for example the patents U. S. to Thyng No. 4276 of 1845; Longstreth No. 249,962 of 1881, and Heffernan No. 412,256 of 1889 and Baker No. 553,298 of 1896, which patents I will refer to more at length hereinafter.

But without any change in the construction or any modification of the devices shown and described in the Buck patent, the disclosure of this patent, in my opinion, constitutes a complete and unequivocal anticipation of the subject-matter of claims 13 and 81 of the first

Brill patent in suit. Each of said claims, in the language in which it is written, and without giving any of its terms any strained or forced interpretation, or any meaning other than they were obviously intended to have in view of the specification, reads directly upon the construction shown and set forth in the Buck patent.

Before leaving this Buck patent, I wish to call attention to a very significant and important bearing that it has upon the construction shown and described in the Brill and Curwen patents before referred to, which construction is practically acknowledged as a part of the prior art by the patentee of the patents in suit.

Buck says in the paragraph beginning near the top of the 2nd column of page 1, that:

"My device admits of some modification without change of principle; for instance, in applying it to short freight trucks, *rigid equalizer bars may take the place of the springs O P*, such bars having the shackle connection *o p q r* with the springs *Q R*, so as to allow the swing of the bolster upon the shackle connection." (Italics mine.)

Here is a clear statement of a fact which is clearly obvious to any one having the most ordinary knowledge of mechanical matters, to wit, that rigid bars and substantially straight or semi-elliptic springs are interchangeable devices which can at will be substituted one for the other, the one being chosen in preference to the other according to the particular object in view. If a more springy or resilient construction is desired, the resilient equalizer bar will be used. If a more rigid structure or connection is desired, a rigid equalizer bar will be used. If this simple substitution, which is so clearly pointed out in the Buck patent, be made in the Brill and Curwen construction, substantially the identical embodiment of the subject-matter of the claims in question, illustrated in the patents in suit would be produced and the claims of the patent would be completely and unequivocally anticipated.

#### Recess.

I observe that the relatively rigid equalizer bars of the Brill and Curwen construction are connected with the bolster through the intervention of springs 45 (see Figs. 1 and 3, Pat. No. 610,118), but it is obvious that, if desired, the equalizer bars could be connected directly with the bolster and, where elastic equalizer bars are employed, they might take the place of the springs arranged between the lower member 38, or "sand plank," as it is termed, forming part of the spring bolster construction shown in the Brill and Curwen patents. But whether or not the intermediate springs 45 are employed, the Brill and Curwen construction with flexible equalizer bars would constitute a full embodiment of the subject-matter of claims 13 and 81 of the first Brill patent in suit for the following reasons: First, the said claims do not specify a direct connection between the bolster and semi-elliptic spring and, second, the use of the bolster employing a spring plank and intermediate springs, is contemplated by Brill as appears from the following language which is quoted from lines 26, *et seq.*, page 3, of the specification:

"The cross-bar can therefore be said to be either a spring plank or a bolster, depending upon the character of its employment. If by choice other springs are supported upon the cross-bar 23—a centre bearing or side springs supported upon the cross-bar by springs—it would specifically be a spring-plank; but when employed in the construction hereinafter described, where the side bearings are spring supported ultimately on the cross-bar and the centre bearing rigidly mounted on the cross-bar such cross-bar can be correctly termed either a 'spring-plank' or a 'bolster.'"

It is noted that the spring links in the Brill and Curwen construction are apparently intended to have free movement with relation to the truck frame in one direction only, to wit, transversely of the truck, there being no necessity for free movement in the longitudinal direction by reason of the employment of substantially rigid equalizer bars. It would be within the knowledge of every competent mechanic however, that where resilient and particularly semi-elliptic spring equalizers are to be employed, provision must be made for some end play of the link connections to make up for variations in the length of the equalizer due to its flexure under the varying forces to which it is subjected; but even if he did not, he is taught by the disclosure of the Buck patent that such universal movement of the spring supporting links should be employed.

It is significant to note in this connection moreover that flexible, and necessarily therefore elastic, equalizing bars are contemplated or suggested in the Brill and Curwen patent. In certain of the claims, see, for example, claims 3 and 4, the equalizing bars are defined as "inflexible." To specify the equalizing bars as being inflexible, at once suggests that they might be flexible, and necessarily, therefore, elastic. The two ideas are inseparable. Inflexible bars cannot be contemplated without at the same time contemplating flexible bars, but, as these bars necessarily carry the entire load of the car body, they cannot be flexible without being, at the same time, elastic.

Clearly, therefore, the disclosure of the Brill and Curwen patent, considered by itself, constitutes a complete embodiment of the subject-matter of the claims in question.

Referring again to the Buck patent, I observe the following statement is made in the specification thereof (2nd column, 2nd paragraph, page 1):

"I prefer to make the springs Q R of sufficient power to hold up their ends on ordinary occasions in contact with the lower side of the intermediate cross-tie; but having sufficient flexibility to  
188 be brought into use as springs on any extraordinary occasions." (Italics mine.)

This is only a preferable feature of the construction, the obvious inference being that the springs Q R, employed in connection with the equalizer suspending links, may be employed as springs are ordinarily employed if desired; but in any event this does not negative the fact that the Buck construction constitutes a full and complete embodiment and anticipation of the subject-matter of the claims in question, in that said claims are not limited directly or indirectly to elastic suspending devices for the semi-elliptic springs, the resilient



members of which suspending devices are not normally under such tension or compression that they will only be brought into play on "extraordinary occasions."

By way of further anticipation of the subject-matter of claims 13 and 81 of the first Brill patent I call attention to the United States patent to Davenport and Bridges, No. 183 re-issue, Dec. 3, 1850. The following introductory statement appears in the specification of this patent (page 1, first column, 2nd paragraph):

"Most persons who travel by railroad experience a continual repetition of sudden jars or shocks arising from the sidewise movement of the flanges of the wheels of the car against the rails of the track, and so extensive are the evils of these frequent shocks, that besides being greatly to the discomfort of the passengers, preventing them almost entirely from reading while traveling in this manner, it is highly injurious to the carriages and axles, causing the joints and other parts to become loose and soon deranged."

The object of the improvements of this patent is to remedy these defects, and the construction whereby the defects are obviated is substantially identical in principle with the construction disclosed and claimed in the patent in suit; that is to say, there is provided between the truck frame and a transverse swing bolster, a pair of elastic equalizing bars upon which the bolster rests and movable and resilient connections by which these elastic equalizing bars are supported from the truck frame. The construction shown in this patent comprises a truck frame including side bars M M provided with the usual journal-box yokes or pedestals and the usual transverse beams or transoms N O; a transverse bolster comprising a lower member of plank Q extending at its opposite ends under the side bars M and having an upright member consisting in part of the bar or plank Z and end supports *h h* (see Fig. 3), located between and guided by the transoms, and, in part of the standards X X (see Fig. 2), said parts carrying, at a point above the transoms and at the centre of the truck, the central pivot bearing *f g* to which the body of the car is pivotally connected. Near its opposite ends, the bolster member Q is provided with cross-bars R R, between which and the frame of the truck the spring connections between the bolster with the truck frame are arranged. These spring connections are described in the patent in the following language:

"Metallic *springs* or plates S S are bolted to the under side of the bars R R, to the ends of which springs common shackles or loops T T are applied, from which shackles suspension links U U or other similar contrivances extend upward, as seen in Figs. 2 and 3, and connect with the loops V V of common semi-elliptic springs W W, suitably applied to the top of the transverse beams N O, as seen in Figs. 1, 4." (Page 1, near end of last column. *Italics mine.*)

The operation and effect of this construction is clearly described in the patent as follows:

"From the above it will be seen that the carriage rests upon the plate Y and the friction wheels, (the plate Y forming the connection between the upright members of the bolster and the pivot bearing

and the friction wheels being the small wheels *i* arranged at the upper ends of the end bearing of the bolster), or, in other words, by means of the intervening parts, on the springs W W, so that its perpendicular movements are relieved by said springs. *The connections of these springs with the lower springs or plates, SS, on the cross-bars R R, by means of the suspension-links U U, admits a pendulous or lateral motion of the plank Q, and consequently the carriage is thus permitted to move sidewise.*" (Page 2, near the middle of the first column. *Italics mine.*)

This disclosure clearly constitutes a full and complete embodiment and anticipation of the subject-matter of the claims in question, it being understood that the spring bars S S of the Davenport construction constitute full equivalents of the ordinary semi-elliptic springs or equalizers, such, for example, as the springs or equalizers O P of the Buck construction.

By way of further anticipation of the subject-matter of the claims in question, I next call attention to the United States patent to Haskins, No. 330,023, dated Nov. 10, 1885.

This patent shows side bars B of a running gear for vehicles, said side bars corresponding to the side bars 5 of the truck of the patent in suit; semi-elliptic springs F connected with the body of the vehicle, said springs corresponding with the elastic equalizers of the truck of the patent in suit; and universally movable and elastic connections C between the semi-elliptic springs and the side bars, said links corresponding to the movable and elastic connections, or links combined with springs, of the truck of the patent in suit. The elastic links of this patent moreover are substantially identical in construction with the elastic links of the Brill construction. Take, for example, the form of link shown in Figs. 1 and 2 of the Haskins patent. This link embodies a bolt or rod *b*, corresponding to the bolt 28 of the Brill construction; a spring C surrounding the rod *b*, substantially identical with the spring 34 of the Brill construction; a nut *c* and washer *f* adjustably secured to the lower end of the bolt, substantially identical with the nut 32 and washer 33 of the Brill construction; a casing or hanger D, substantially identical with the stirrup or hanger 37 of the Brill construction, the same having a perforation *a* at its upper end through which the bolt *b* passes and being arranged to enclose the spring and rest upon the upper end thereof, and being connected at its lower end to the extremity of the semi-elliptic spring.

190 This spring link of the Haskins patent is like the spring link of the patent in suit and, like the construction of that patent, this spring link is connected to and supports the end of the semi-elliptic spring by suspending it from the side bar of the running gear frame, so that the body of the vehicle is free to move with relation to the frame and thus not be subjected to the jerk or jar which may be imparted to the running gear frame as a result of unevenness in the roadway on which the vehicle is traveling. Provision is also made in this construction for the necessary end play of the semi-elliptic spring resulting from variations in its degree of flexure.

The objects of this construction are, moreover, substantially the same as the objects of the construction in the patent in suit. The patentee states the objects of the invention in the following language:

"The object of my invention is to provide a novel and efficient spiral spring adapted to be used either separately or in combination with any of the various forms of leaf-springs now in use upon wagons and other vehicles.

"It is my further object to provide a spring which will be both simple in construction and inexpensive, and which, *when used either separately or in combination with other springs*, may be readily adjusted to the various loads to be carried, will permit the body of the vehicle to which they are attached to be placed lower than is possible with the use of springs heretofore constructed. The springs may be easily replaced or repaired, and when used upon carts or other two-wheeled vehicles will in a great measure overcome the 'horse motion' or 'jolt' caused by the movements of the horse." (Page 1, lines 17 *et seq.* Italics mine.)

The fact that the patentee has illustrated and specifically described his construction in connection with a wagon instead of in connection with a car truck, is entirely immaterial; so far as the effect of the disclosure as an anticipation of the subject-matter of the claims in question is concerned. So far as this subject-matter is concerned, wagons and car trucks belong to the same art. The operation of the spring connections between the bodies of the vehicles and the frames of the running gear is substantially the same. In each case the object and operation of the spring connections are to absorb, as far as possible, the sudden vertical and sidewise motions of the running gear, or the running gear frame, with relation to the vehicle body, so as to avoid the evil effects of unevenness in the roadway or track over which the vehicle is passing.

The patentee Haskins, moreover, evidently contemplated the application of his construction to other vehicles than wagons, as is shown by the language above quoted.

The fact that running gear constructions for wagons or carriages and running gear constructions for railway cars and other rolling stock belong to the same art, is clearly shown by other patents to which my attention has been called. In the patent to Spencer and Stidolph previously referred to, the improvements are said to relate, and obviously do relate, to "bearing springs for carriages, trucks, and locomotive engines for railway, tramway and common roads."

In the United States Patent to Block No. 413,555, dated Dec. 3, 1911, 1889, the improvements are said to relate, and obviously to relate, to "all classes of vehicles which are subject to longitudinal or lateral shocks, and which are designed for such uses as to render it desirable to ease up these shocks as much as possible." The improvements of this patent refer to the spring connection between the running gear and the body of the vehicle and the construction is illustrated as applied to various forms of vehicles, including railway car trucks and common road carriages or wagons.

The fact that the Haskins construction is illustrated in connection with a wagon or carriage, is rather in its favor than otherwise as a

disclosure of means for effectively overcoming or reducing the shock or jar or jerk which is liable to be transmitted from the running gear to the vehicle body, in that a wagon or other vehicle running on common roads *are* subjected to greater vertical and lateral movements owing to the unevenness of the roadway than are vehicles running on the specially and carefully prepared tracks of a railway.

I am clearly of the opinion that the Haskins construction constitutes a substantial embodiment and anticipation of the subject-matter of the claims in question, notwithstanding the fact that, as specifically illustrated in the drawings of the Haskins patent, the semi-elliptic springs are not shown as arranged in pairs and connected near the ends of a transverse bolster of the vehicle as is apparently contemplated in claim 81 of the first patent in suit. The semi-elliptic springs of the Haskins patent obviously act as equalizers; they carry the body of the vehicle and they are connected to and suspended from the side frames of the running gear by a movable and elastic connection and, specifically, by links combined with springs. The construction and operative relation of the connections between the vehicle and the running gear are the same in substance and effect as the corresponding parts of the construction disclosed and claimed in the patent in suit. Clearly it is a mere matter of choice or selection on the part of a mechanic skilled in the art to apply the Haskins construction to any particular form of vehicle running gear.

As I have already pointed out, Brill was not the first to employ flexible or elastic equalizing bars in connection with the bolster of a pivotal swing bolster car truck. This is clearly shown to be old in the art long prior to Brill's patents, by the patents to Buck and Davenport & Bridges above referred to, and it is also contemplated in the patents to Brill & Curwen referred to. Neither was Brill the first to employ flexible equalizing bars specifically in the form of semi-elliptic leaf-springs in such relation, nor to suspend such elastic equalizing bars from the truck frame by flexible or jointed links which permit movement of the springs and parts carried thereby with relation to the truck frame. This is shown by the patent to Buck referred to and also by the patent to Thyng, No. 4276, dated Nov. 18, 1845.

The patent to Thyng shows a four-wheeled swing bolster pivotal car truck which is substantially identical as to its general features with the car truck shown in the patents in suit. The truck frame of the Thyng patent has side frames carrying the usual journal box guiding yokes or pedestals and transverse beams or transoms between which the transverse bolster is arranged and guided; the  
192 bolster has a central pivotal bearing and end bearings for the car body; it is supported on longitudinally extending semi-elliptic springs arranged outside of the wheel gauge and beneath the upper longitudinal bar of the side frames; the ends of the semi-elliptic springs are suspended from the side bars of the truck by pivoted links; the links are flexibly or movably connected with the side bars at points near the axle boxes so as to provide for a limited transverse movement of the bolster with relation to the truck frame;

the construction of the links and of the connections between the links and the side bars of the truck frame are such as to afford the necessary end play of the semi-elliptic springs in operation; the bolster has transverse and sidewise movement as far as the truck frame and transoms will permit, swinging on the links. In short, the Thyng patent shows every feature of the claims in question with the sole exception of extensible or elastic connections between the ends of the semi-elliptic equalizing springs and the side bars of the truck frame.

Adjourned until tomorrow, Wednesday, May 17th, same place and time.

WEDNESDAY, *May 17th*—10:30 a. m.

Same place.

Appearances as before.

The witness continues his answer to question 4.

The U. S. Patent to Romans, No. 34,270, dated Jan. 28, 1862, shows another example of a pivotal swing bolster car truck, in which the connection between the bolster and the frame of the car truck consists of semi-elliptic equalizer bars arranged longitudinally of the truck, and secured to the under side of the bolster near its opposite ends, said equalizers being connected to the frame of the truck by flexible or pivoted links which are obviously intended to provide for a limited transverse swinging movement of the bolster and its load in relation to the truck frame, and also to provide for the slight end play of the equalizer springs when in action.

I note that the spring supporting links of the Romans construction are connected with transverse beams R R of the truck frame (see Fig. 4), instead of being directly connected with the upper transverse bars of the side frames, the same being in this respect more like the Buck in construction than the Thyng. This difference, however, is entirely immaterial so far as the subject-matter of the claims in question is concerned. The patent to Romans shows every feature of each of claims 13 and 81 of the first Brill patent, with the sole exception of extensible or elastic connections between the ends of the semi-elliptic equalizing springs and the truck frame.

U. S. Patent to Adams, No. 538,858, dated May 7, 1895, shows another example of the use of longitudinally extending semi-elliptic equalizer springs arranged between the bolster of the truck and the truck frame. In this patent, moreover, the semi-elliptic spring is arranged beneath the upper longitudinal side bar of the truck frame,

and it is connected to said bar at points near the journal-box  
193 pedestals by pivoted links which afford free endwise play of the spring in operation.

This Adams patent meets the substance of the claims in question, and in fact, the precise terms of claim 13, with the exception of the resilient feature of the connection between the ends of the equalizer springs and the truck frame.

The U. S. Patent to Baker, No. 553,298, dated Jan. 21, 1896, shows another example of the use of longitudinally arranged semi-elliptic elastic equalizer springs supporting the bolster of a pivotal

swing bolster car truck, and connected by flexible connections with the side frames of the truck at points near the axle-boxes. These springs, moreover, are arranged outside of the wheel gauge and substantially in the plane of the side frames, and the connections between the equalizer springs and the side frame provide for free endwise play of the springs. This patent does not show a common form of swing bolster truck; that is to say, no provision is made for a substantial end play of the bolster, together with its supporting springs, transversely of the truck. The claims in question, however, are not limited to a swing bolster construction. This patent, therefore, discloses every feature of the claims in question combined and arranged substantially as specified in the claims, with the sole exception of the resilient characteristic of the link connections between the ends of the equalizer springs and the truck frame.

Flexibly or movably mounted elastic links or connections between a part or load and the frame of a running gear are old and common features in the art of vehicle running gear construction and in the specific branch of that art which embraces railway car trucks. I have already given several examples of such movably mounted elastic connections combined with semi-elliptic load carrying equalizer springs. Other examples of this character of support are found in the following patents:

U. S. Patent to Peckham, No. 563,685, dated July 7, 1896, shows a connection of the character referred to, which is substantially identical in construction and mode of operation with the particular form of elastic support shown and described in the first Brill patent. This Peckham patent shows in Fig. 4 a universally movable spring link which has at its upper end a ball and socket joint connection with the upper side of a truck frame bar, and it embodies a spring with which the part it supports engages. Peckham employs this spring to support the motor in his truck, but obviously it is immaterial whether the load supported by the universally swinging elastic link of Peckham be a portion of the weight of a motor or a portion of the weight of a car body. The construction and operative relation of the parts being once understood, are adaptable within the common knowledge of any ordinary mechanic to a variety of mechanical constructions.

It is obviously within the province of the ordinary mechanic, skilled in the art of truck construction, to substitute this Peckham link for the particular form of links employed in any one of the patents above referred to for connecting the ends of semi-elliptic equalizer springs with the frame of the truck. Take, for example,

the Thyng construction; the Peckham link is obviously as well adapted for supporting the opposite ends of the semi-elliptic springs of this patent as it is for supporting the motor in the Peckham patent.

I have before me a model of a truck which is built in accordance with the Thyng patent as to its general features, and at one side of the model the connections between the ends of the bolster and the upper bar of the said frame, to wit, the semi-elliptic spring, and the jointed links or shackles, are the same as the corresponding parts



illustrated in the Thyng patent. On the other side of the model, the semi-elliptic spring is employed but in place of the Thyng links, a Haskins link and a Peckham link are employed. The Haskins link is built in substantial accordance with the form of link shown in Figs. 1 and 2 of the Haskins patent before referred to, and it is connected at one end with the side bar of the frame by a pivot joint similar to the pivot joint between the link and the side frame shown in Figs. 1 and 2 of the Haskins patent. It is connected at the other end of the semi-elliptic spring, by a pivot joint identical with the pivot joint between the lower end of the link and the semi-elliptic spring shown in Figs. 1 and 2 of the Haskins patent.

The Peckham link employed in the model is constructed substantially like the Peckham link shown in Fig. 4 of the Peckham patent, No. 563,685; that is to say, the link consists of a rod or bolt having at its upper end an enlargement provided with a spherical surface seated in a corresponding recess formed in the upper part of the bearing member, rigidly secured in the truck frame, and at its lower end it is threaded and provided with a nut and washer, between which and the member supported on the link, is arranged a spiral spring which, by its compression, affords an extensible and resilient connection between the truck frame and the member supported thereby.

Similar universally movable and elastic links or connections are shown in the United States patent to Peckham, No. 424,723, April 1, 1890, and clearly disclosed in the English patent to Spencer and Stidolph, above referred to.

If the defendant's structure is to be regarded as embodying a universally movable elastic link connection, then such connections are also found in the U. S. Patents to Peckham, No. 464,253, Dec. 1, 1891; Overbaugh, No. 104,876, June 28, 1870; and Beach, No. 173,257, Feb. 8, 1876. The Peckham patent, last referred to, shows a link for supporting a motor on a railway truck, which passes loosely through an enlarged opening in the truck frame, and is provided at its upper end with an enlargement resting on a rubber buffer spring (see Fig. 3). The patent to Overbaugh shows a similar link combined with an equalizer bar and a load bearing spring arranged between the axle-box and frame of a car truck. The patent to Beach shows a link (see Fig. 7), consisting of a bolt or rod H having a pivot connection at its upper end, with a spring supported cap and a pivotal connection at its lower end with the transverse transom of a car truck. The pivotal connections between the bolt and spring supported cap on the one hand and the transom on the other hand, are such as to provide a free swinging movement of the transom, both longitudinally and transversely of the truck, the openings in  
195 the frame through which the links pass being sufficiently large to permit such movement.

Obviously it would involve nothing more than the exercise or ordinary mechanical intelligence to substitute the spring links of these patents for the pivotal connections between the semi-elliptic spring equalizers and the truck frame of any truck construction embodying such connections, as shown, for example, in the patent to



Thyng. I have before me two models representing one of the side bars of a truck frame, and the Thyng semi-elliptic spring equalizers connected to the top bar of the side frame by such links as are found in the patents last above referred to. In one of these models, the Thyng spring equalizer with its end shackles, are connected to links constructed in accordance with the teachings of the Overbaugh patent. In the other model, the T-ying equalizer bar is connected with the top bar of the side frame by universally movable spring links, constructed in accordance with the teachings of the Beach patent.

The Thyng, Romans, Adams or Baker constructions, with the movably supported and resilient link connections shown in either of the patents to Spencer and Stidolph, Haskins, Peckham, Overbaugh and Beach, used in place of the non-resilient connections between the semi-elliptic equalizer springs and the side frames of the truck, would constitute complete and unequivocal embodiments and anticipations of the subject-matter of each of the claims 13 and 81 of the first Brill patent.

Adjourned to same place and time, tomorrow, May 18th.

THURSDAY, May 18th—10.30 a. m.

Same place.

Appearances as before and Francis Rawle, for Complainants.

The witness continues his answer to question 4.

Brill Patent, No. 627,900, June 27, 1899.

This patent, so far as the illustration goes, shows the same construction at the first Brill patent, with the exception of the elastic extensible links which connect the end of the semi-elliptic equalizer springs to the truck frame.

The links of this patent have the same character of ball and socket connection with the side frames of the truck as the links of the first patent, and, like the links of the first patent, the links of the second patent are made up of two sections; but instead of using a bolt section and a stirrup or hanger sliding thereon with an interposed spring, as in the first patent, the link of the second patent is composed of two bolt sections having a pivotal or articulate connection one with the other at a point near the longitudinal centre of the links. As clearly shown in Figs. 3 and 4, the link comprises bolt members 26 and 27 pivotally connected by pin 30. The end of the semi-elliptic spring is connected with the lower bolt section 27 in a manner similar to that in which the end of the semi-elliptic spring is connected with the bolt section of the first Brill patent; that is to say, the bolt section 27 is provided at its lower end, with a nut 34 and washer or spring cup 35, between which and a suitable spring receiving washer or casting 37, is arranged a spiral spring 36 which,

by its compression, affords an elastic connection between the  
196 end of the semi-elliptic springs and the lower end of the link,  
and therefore, constitutes the resilient member of the link.

Claims 13, 14, 15 and 17 of this patent differ in subject matter from claims 13 and 81 of the first patent in that they refer more

particularly to the details of the spring link construction, and, specifically, to the form of link construction illustrated in this second patent.

Claim 13 reads as follows:

"13. In a car-truck, the combination with side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described."

This claim obviously refers to, and includes, the double bolt construction of the links, the universal pivot joint connection between the links and the truck frame and the springs arranged between the lower bolt section and the ends of the semi-elliptic springs.

This specific form of link, however, was not original with Brill. It is found in almost the exact form illustrated in the second Brill patent in the U. S. Patent to Cooke, 595,045, Dec. 7, 1897, the application for which patent was filed prior to the filing of the applications of either the Brill patents in suit. In this Cooke patent, the links comprise upper and lower bolt sections 18 and 19, and the lower bolt section 19 is provided with a nut and washer 22, between which and the end of an equalizing bar 20, is arranged a spiral spring 21, which, by its compression, affords an elastic support for the equalizer bar. In this Cooke construction, moreover, these spring links are employed in substantially the same general combination and are arranged in substantially the same operative relation with the other parts of the combination, as is the case with the links shown, described and claimed in the second Brill patent. The Cooke patent shows a pivotal swing bolster truck, and the bolster is supported on equalizer bars 20, arranged longitudinally of the truck, at the opposite ends of the bolster outside the wheel gauge and beneath the upper bar of the truck side frames, from which upper bar, at points adjacent to the journal-box pedestals, the said equalizers are suspended by the spring links. The only difference between this Cooke construction and the particular construction shown, described and claimed in the second Brill patent, is, that in the Brill patent an elastic equalizer bar, in the form of a semi-elliptic spring, is employed in the place of the relatively rigid equalizer bar and, to accommodate the slight end play of the said semi-elliptic equalizer bar, the links are so connected by universal joints with the truck frame, that they may swing in a direction to accommodate the end play as well as in the transverse direction to accommodate the end play of the bolster. In the Cooke patent, the pivot joint between the links and the truck frame is such as to permit free or unrestrained movement of the links only in the transverse direction,

and this movement is all that is required where rigid equalizer bars are employed. Rigid and semi-elliptic spring equalizer bars were known to be substitutes one for the other long prior to the Brill patents. This seems like an obvious proposition;

but whether it is or not, it is clearly stated in the patent to Buck, No. 112,897, previously referred to. For the convenience of the Court, I will again quote the statement in the Buck patent referring to this feature:

"My device admits of some modification *without change of principle*; for instance, in applying it to short freight trucks, *rigid equalizer bars may take the place of the springs O, P*, such bars having the shackle connection *a p q r* with the spring Q R, so as to allow the swing of the bolster upon the shackle connection." (Italics mine.)

It will also be remembered that in this Buck patent, provision is made for the free swing of the links which support the semi-elliptic equalizer bars in both longitudinal and transverse directions. It is obvious that any one having the slightest knowledge of mechanical matters and a sufficient knowledge of the practical art to supply the right proportions and strength of parts, could substitute semi-elliptic equalized bars for the rigid equalizer bars of the Cooke construction, and that in making such substitution, it would at once be known that suitable provision should be made in the connections between the links and the truck frame to allow for the slight end play of the spring equalizers, as well as for the limited end play of the transverse bolster.

Another example of a link constructed of two members joined together at a point intermediate the length of the link and including a resilient member or spring, is found in the patent of Haskins, No. 330,023, previously referred to. I refer to the form of link shown in Fig. 6 of this patent, wherein the upper member C of the link is pivotally connected with the side bar of the running gear of the vehicle by a joint permitting unrestrained movement of the link in both longitudinal and transverse directions, and is pivotally connected by a similar joint to a lower member which is connected to the end of a semi-elliptic body supporting spring F. The resilient feature of this link is associated with the upper member instead of the lower member and instead of being in the form of a spiral spring, **made of a piece of metal distinct from that forming the link member**, is made integral with the link member. This is a full equivalent of the construction set forth and claimed in the second Brill patent, and, indeed, if claim 13 of this patent is to be given a sufficiently broad interpretation to include the defendant's construction, the **Haskins link referred to constitutes a complete and even a closer embodiment of the link feature of the said claim than does the link of the defendant's construction.**

I would, furthermore, call the attention of the Court to the fact that if claim 13 of the second Brill patent is to be given a sufficiently broad interpretation to include the defendant's construction, it must necessarily include also the constructions of the Buck patent and the

Davenport & Bridges patent, in each of which the links from 198 which the semi-elliptic equalizing bolster carrying springs are suspended, are formed of two members jointed or articulated at an intermediate point and associated with "further springs included in the link suspension of said semi-elliptic springs."

The subject-matter of claim 13 would likewise be embodied in and

anticipated by the Thyng, Romans, Adams and Baker construction, if such elastic and articulate connections as are found in the Cooke Haskins, Buck, Davenport & Bridges, Overbagh and Beach patents were employed in place of the articulated but non-elastic connections by which the semi-elliptic load carrying equalized bars of each of the Thyng, Romans, Adams and Baker constructions are suspended from the truck frames. As I have before pointed out, such substitution is clearly within the province of the ordinary mechanic skilled in the art of truck construction.

I am clearly of the opinion, therefore, that claim 13 of the second Brill patent is fully embodied in and anticipated by numerous constructions of the prior art.

Claim 14 of the second Brill patent reads as follows:

"14. In a car-truck, the combination with a side frame, of the cross-bolster suspended below the side frame by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frame, substantially as described."

This claim differs from claim 13 principally in that it defines the links as comprising "a plurality of sections pivotally secured together" instead of "bolts pivoted between their ends." Claim 14, therefore, is broader in terms than is claim 13, and it clearly reads in terms and in substance directly upon the construction of the Buck patent and upon the construction of the Davenport & Bridges patent with semi-elliptic spring used in place of the spring equalizers S S. This claim is also embodied in and anticipated by each of the constructions of the prior art which I have above referred to as anticipatory of claim 13.

Claim 15 reads as follows:

"15. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and articulate and pivoted links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend and semi-elliptic spring from the side frames, substantially as described."

This claim differs from claim 14 in substance only in that the "further springs" are defined as being spiral springs and as arranged about the links. This specific feature, however, is old and common in the art, as shown in the patents to Cooke, Haskins, Overbagh and Beach. Clearly this claim cannot be said to define material novel subject-matter which is not defined in claims 13 and 14, and which is not anticipated in the prior art, as claims 13 and 14 are anticipated.

Claim 17 is expressed in the following language:

"17. The combination in a car-truck having an upper  
199 chord, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported on said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between

their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

This claim is more limited than either of claims 13, 14 and 15, in that it specifically defines the pivotal connection between the links and a particular part of the car-truck frame, and in that it states that the semi-elliptic springs are supported upon the lower members of the links. The claim is less limited than claims 13, 14 and 15, in that it does not include the resilient feature of the links.

The particular form of joint between the upper end of the links and the truck frame is found in the patent to Peckham, No. 563,685 (see Fig. 4). As before explained, this patent shows a link having an enlarged upper end provided with a spherical surface seated in a corresponding recess formed in a member corresponding to the upper chord member of the car-truck frame, and the link passes downwardly through an enlarged opening in said members and is connected at its lower end through the intervention of a spring with one end of a load-carrying equalizing bar.

If this claim is to be given an interpretation which will cause it to include the defendant's construction, it also defines the forms of connections disclosed in the Beach patent and in the English patent to Spencer and Stidolph. In this connection, the latter patent makes the following statement:

"One object of these improvements is to *give a better lateral action* to the carriage body. To effect this the spring pin may be left somewhat free in its hole D; the hole E in the supporting bracket may be made conical or spherical surfaces may be used to effect the same object" (Italics mine.)

Obviously, the construction would be the same in principle and mode of operation if the link were connected to the side bar of a truck frame as when used in the particular relation indicated in this patent.

I find nothing of novelty, therefore, in this 17th claim. It certainly defines nothing which can be regarded as of material importance or as constituting a substantial departure from the subject-matter set forth in claims 13, 14 and 15, and which is so abundantly disclosed in the prior art.

Counsel for complainants object to so much of the answer as refers to Letters Patent other than those in suit; and to certain models, such Letters Patent and such models not having been offered in evidence; also to so much of the answer as usurps the function of the Court by giving the opinion of the witness as to matters which he considers "anticipation" of the claims of the patents in suit and in other ways. A motion is made to strike out the answer so far as objected to and to tax the costs thereof against the defendant.

Counsel for defendant offers in evidence Patent Office copies of the Letters Patent referred to by the witness and the same are marked:

## United States Patents.

Defendant's Exhibit	Davenport & Bridges, 1850 patent.
"	" Thyng, 1845 patent.
"	" Romans, 1862 patent.
"	" Overbagh, 1870 patent.
"	" Buck, 1871 patent.
"	" Beach, 1876 patent.
"	" Longstretch, 1881 patent.
"	" Haskins, 1885 patent.
"	" Heffernan, 1889 patent.
"	" Block, 1889 patent.
"	" Peckham, 1890 patent.
"	" Peckham, 1891 patent.
"	" Graham, 1893 patent.
"	" Adams, 1895 patent.
"	" Peckham, 1896 patent.
"	" Baker, 1896 patent.
"	" Cooke, 1897 patent.
"	" Brill & Curwen, 1898 patent.
"	" Brill & Curwen, 1898 patent.

Also copy of Letters Patent No. 635,986 issued Oct. 31, 1899, to C. F. Uebelacker, marked "Defendant's Exhibit, Uebelacker, 1899 patent."

## Patents of Great Britain.

Defendant's Exhibit Spencer & Stidolph, 1876 patent.

Counsel for defendant offers in evidence the models referred to by the witness, and the same are marked:

"	"	Defendant's Exhibit, Model, Buck Truck
"	"	Model, Thyng Truck
"	"	Model, Overbagh Spring Hanger
"	"	Model, Beach Spring Hanger.

The Letters Patent and models referred to by the witness having been offered in evidence, so much of the above objection as relates thereto is withdrawn by counsel for complainants.

Counsel for defendant also offers in evidence, Copy of File Wrapper and Contents of Letters Patent No. 627,898, dated June 27, 1899, to George M. Brill, and the same is marked "Defendant's Exhibit, File Wrapper & Contents of Brill's Parent Patent."

Counsel for defendant offers in evidence copies of certain letters from the File Wrapper and Contents of Letters Patent No. 627,900, dated June 27, 1899, to George M. Brill, and same are marked: "Defendant's Exhibit, Letters from File Wrapper of Brill's Secondary Patent."

Counsel for defendant offers in evidence three (3) catalogues bearing upon the front page thereof, respectively, the following: "J. G.

201 Brill Company, Philadelphia, U. S. A.," and entitled "The Universal Truck," "The Perfect Passenger Truck," and "Fifteen Months of Experience with a Perfect Passenger Truck"; and the same are marked respectively; "Defendant's Exhibit, Brill Circular No. 27-D Truck," "Brill First Circular, No. 27 Truck," and "Brill Second Circular, No. 27 Truck."

Recess.

Counsel for complainants object to all the models offered on the ground that no proof has been given as to their construction or as to what they represent, or that they correctly represent anything relevant to the case.

Also because they do not correctly represent the things which they purport, or have been stated to represent.

Also because the said models are inadmissible.

Objection is made to all the letters patent offered, because they are irrelevant and immaterial.

Special objection is made to all of the letters patent offered whose date of issue is subsequent to the date of application (July 3, 1897), of the letters patent in suit.

Objection is also made to any of the said patents that have not been properly pleaded.

Objection is made to the offer of "copies of certain letters from the file wrapper and contents of patent No. 627,900," because the same is only a part of a record.

Counsel for defendant suggests in reference to the second paragraph of the objections, that if testimony has been given or it has been stated, under oath, as herein intimated, that the models correctly represent the various patent disclosures heretofore referred to, it is obvious that proof, mentioned in the first paragraph of the objection, has been already given. Counsel for complainants is referred to the previous testimony of the witness which clearly proves the facts required. Moreover, counsel for complainant is challenged to point out any substantial or material respect in which the models fail to correctly present the things which they purport to.

With respect to the fifth paragraph of the objection, complainants' counsel is reminded that there is a stipulation in this case under which the filing dates of all patents offered in evidence, as the same appear upon the faces thereof, shall be taken to be *prima facie* correct.

With respect to the sixth paragraph of the objection, complainants' counsel is requested and challenged to point out any letters patent adduced in evidence which have not been properly pleaded, in order that the same may be remedied, if any defect exists.

With respect to the last paragraph of the objection, counsel for defendant replied that opposing counsel is at liberty to offer the balance of the file wrapper and contents of patent No. 627,900 in evidence.

Q. 5. I hand you "Complainants' Exhibit, Photograph of Defendant's Car" and "Complainants' Exhibit, Drawing of Defendant's



202 Truck," and ask you, in this connection, whether the model to which I draw your attention, correctly represents either or both of the same, and in what particulars, if any, it varies therefrom?

A. The model correctly illustrates or embodies the construction illustrated in the drawing of defendant's truck in every material respect except that the openings in the truck frames through which the spring-suspending links pass, are made circular in outline in the model so that, so far as the openings are concerned, the links are as free to move or swing as far in the longitudinal direction as in the transverse direction, whereas in the drawing the said openings are oblong in outline and arranged with their longest dimension extending transversely of the truck, so that as regards these openings the links are not free to swing in the longitudinal direction as far as they are free to swing in the transverse direction.

This feature of the construction does not appear on the photograph of defendant's car. The construction shown in the photograph is apparently accurately represented in the model with the exception that in the model the equalizer semi-elliptic springs have considerable of an arch form, whereas in the photograph the springs appear to extend in substantially a straight line on their underside. I observe, however, that in the photograph the equalizers are carrying the weight of the car body, whereas in the model they carry only the weight of the bolster. It is possible that if the springs of the model were loaded with a weight proportional to the weight of the car body shown in the photograph, the springs would have the form shown in the photograph.

Counsel for defendant offers the model referred to in evidence and the same is marked "Defendant's Exhibit, Illustrative Model of Defendant's Truck."

Complainants' counsel asks what defendant's counsel expects to prove by this offer.

Defendant's counsel replies that, although an answer does not seem at all necessary, the matter being properly left for development, he will say that, among other things, the model has been offered in evidence in order to assist the witness in presenting certain hereafter-to-be-disclosed facts to the court and to aid the court to discern from a practical standpoint the general features of construction embodied in defendant's truck complained of in this suit.

Complainants' counsel postpones objection to the offer until the close of the cross-examination of the witness thereupon.

Q. 6. Please compare the construction of defendant's truck, as disclosed in Complainants' Exhibit, Drawing of Defendant's Truck, more fully exemplified in Defendant's Exhibit, Model of Defendant's Truck, with the patents in suit, more particularly with the specific claims thereof in suit, and state your conclusions as to the similarities and differences?

Complainants' counsel makes the same statement.

A. The defendant's truck, as illustrated in the drawing and as exemplified in the model, is, like the truck of the patents in suit, a piv-

203 otal, swinging bolster car truck. The frame of the truck comprises single bar members having journal-box pedestals and the usual spiral spring is arranged between the journal-boxes and the upper ends of the pedestals, so that the frame is spring supported on the wheels. The side frames are connected transversely by the usual beams or transoms between which is guided the bolster adapted to have a limited end play transversely of the truck, and having a central pivot bearing and two end bearings for the car body. At its opposite ends the bolster is provided with downwardly and outwardly extending brackets or castings, the outer ends of which project beneath the side frame bars beyond the wheel gauge and are there connected to longitudinally arranged semi-elliptic spring equalizers which are suspended from their opposite ends from the side frame bars at points near the journal-box pedestals in such manner that the semi-elliptic springs, together with the bolster indirectly carried thereby, are free to swing a limited distance transversely of the truck. As so far described, the defendant's truck is as much like the truck of the old Thyng patent as it is like the truck of the patent in suit, and in one respect it is even more like the Thyng truck. I refer to the single side bar feature of the side frames. The equalizer spring supporting links of the defendant's truck, instead of having a universal joint connection with the upper surfaces of the side bars of the truck frame, affording unrestrained movement in both longitudinal and transverse directions, as is the case in the Brill truck, receive their support from points considerably above the upper side of the truck frame side bars by joints which afford unrestrained movement in one direction only, to wit, transversely of the truck. The upper pivotal joints of the links are formed in cap castings, between which and a ledge forming the bottom of recesses extending downwardly in and more than half way through the vertical extent of the truck frame side bars, are arranged stiff buffer springs, which have for their purpose the avoidance of a direct metal to metal contact between the upper ends of the links and the side frame, such as that provided in the construction set forth in the patent in suit. With the proportions as shown in the drawing of the defendant's truck, and as made in the model of the defendant's machine, these spiral springs are much stiffer than the semi-elliptic spring equalizers and, in my opinion, would add little, if any, to the practical elasticity of the supports for the car body.

The links of the defendant's construction are connected at their lower ends to the ends of the equalizer bar by the ordinary pivot shackles, such as are commonly, if not almost universally employed in connection with the ends of semi-elliptic springs, the same being shown, for example, in the Thyng, Romans, Buck and Haskins patents, before referred to.

The connections between the ends of the flexible equalizers and the truck frame of defendant's structure are much more like similar connections found in the art prior to the patents in suit, than they are like the connections of the patented device. The defendant's connections, for example, are, both in construction and in function, more like the connections of the patented device. The defendant's con-

464,253, or the connection shown in the English patent to Spencer & Stidolph, or like the connections shown in the patent to Overbagh, or like the connections shown in the patent to Beach, all of which have been above referred to, than they are like the connections of the patents in suit. The patent to Beach, in fact, shows a very close approximation to the construction of the links and springs employed in the defendant's truck. There is the downwardly extending pivot rod or bolt, having a pivotal connection at its upper end with a cap plate or casting, between which and the bottom of an enclosing recess or chamber are arranged a plurality of spiral springs. Practically the only difference between these two constructions is that a series of spiral springs are used in place of one, and these springs are evidently intended to be so proportioned that they will afford a practically elastic or resilient connection or support for the bolster of the truck and the load carried thereby. The links of the Beach construction, like the links of the defendant's construction, are so connected to the cap plates that they have free or unrestrained pivotal movement in one direction only, to wit, transversely of the truck, and they are pivotally connected at their lower ends to the bolster so that the latter has free movement for a limited extent transversely of the truck in a manner common to swing bolster trucks.

Comparing now the defendant's construction with the particular claims which have been called to my attention of the patents in suit, I find that, if claims 13 and 81 of the first Brill patent are to be understood in the broad sense in which I understand them, as explained in my previous answer, and in the broad sense in which they were evidently intended to and must be understood, in view of the description of the patent, to which each of them make a specific reference, they include the defendant's construction, but they necessarily also include and are as clearly embodied in the constructions of the prior art, as explained by me at some length in my preceding answer, which explanation it will not be necessary for me to repeat here. If, however, these claims are to be understood in a more limited sense and as having for their subject-matter only the particular construction shown and specifically described in the patent, then they do not include and are not embodied in the defendant's truck.

If, for example, claim 13 is to be understood as referring to suspensions for the semi-elliptic springs, which have a direct engagement with the truck frame side bars and a free movement in both directions with relation thereto, or if said claim is to be understood as referring to a bolster which is directly secured to the semi-elliptic springs, as shown and carefully described in the patent, then said claim, as to either of these features, is not found in the defendant's truck.

If claim 81 is to be understood as referring to a cross bolster which rests directly on the semi-elliptic springs, or to links which derive their support directly from the side frame, as carefully shown and described in the patent, then the defendant's construction does not form an embodiment of this claim.

If claim 13 of the second Brill patent is to be understood as refer-

205 ring to links formed of two bolt members, or to links which are pivotally suspended from the side frames, so as to have unrestrained movement in both the longitudinal and transverse directions, or to links which have direct pivotal engagement with the side frame, or to the cross bolster, which has a practically direct engagement with the semi-elliptic springs, or to springs which are included between the pivotal connection of the links with the side frames and the semi-elliptic springs, then the defendant's truck does not form an embodiment of said claim.

If claim 14 of the second patent is to be understood as referring to pivotal links which have unrestrained movement in both the longitudinal and transverse directions, or to link sections which are other than mere shackle connections, or to spiral springs which are arranged about the link sections and between the pivotal connection of the links with the truck frame and the semi-elliptic springs, then the defendant's construction does not constitute an embodiment of this claim.

If claim 17 of the second patent is to be understood as referring to a bolster which is supported directly upon the semi-elliptic springs, or to links which depend directly from the upper chord of a truck frame, or to links which are flexibly supported on said upper chord so as to have unrestrained movement in both the longitudinal and transverse directions, or to truck frame side bars which have enlarged openings of such a character as to permit free movement of the links through a considerable extent longitudinally of the truck as well as transversely thereof, or to links which have pivot sections other than the ordinary shackles, commonly employed in connection with semi-elliptic springs, then the defendant's structure, and particularly that shown in the Complainants' Exhibit, drawing of Defendant's Truck, does not constitute an embodiment of this claim. In short, if the claims of this patent are to be understood as referring to the particular construction shown and described in this patent, they do not include and are not embodied in the defendant's truck, and, as I have pointed out at some length in my previous answers, they must be so understood if they are to be interpreted as covering novel subject matter in view of the devices of the prior art. I will not burden the record by again setting forth the relation between these claims and the prior art with the defendant's construction more particularly in view as I do not understand that the question calls for such discussion.

Adjourned to Friday, May 19th, 10:30 A. M.

FRIDAY, May 19th.

Appearances as before.

Same place.

Counsel for defendant offers in evidence copy of the opinion of the Circuit Court of Appeals for the Third Circuit in the suit of John A. Brill vs. The North Jersey Street Railway Company.

Also copy of final decree entered in said suit, and the same are marked respectively "Defendant's Exhibit, North Jersey Opinion on Appeal"—"Defendant's Exhibit North Jersey Final Decree."

206 Complainants' counsel object to the offer as being *res inter alios acta*, and as irrelevant and inadmissible.

No objection made to lack of certification of copies.

Counsel for defendant also offers in evidence a catalogue upon the face whereof appears the words: "Published by J. G. Brill Company" and same is marked "Defendant's Exhibit Brill Catalogue by John A. Brill." The cover at the back is not included in the offer.

Counsel for defendants further offers in evidence two blue-print copies of certain drawings, in the upper right-hand corner whereof appears respectively the numbers "597" and "418" and the same are marked respectively "Defendant's Exhibit Enlarged Drawing of part of Fig. 2 of Davenport & Bridges' Patent" and "Defendant's Exhibit Proportional Wheel Bases."

Counsel stipulate that ALLAN FOOSE, if called as a witness, would testify as follows:

"During the past five years I have been engaged exclusively in making drawings in connection with inventions either for use in the Patent Office or for use as Exhibits in Court.

A certified copy of the patent to Davenport and Bridges for Car Truck, No. 183, reissued December 3, 1850, was given me with instructions to make a duplicate of what is shown at the left-hand of Fig. 2 of the drawings of said patent on an enlarged scale. In accordance therewith, I made the drawing which is marked "Defendants' Exhibit enlarged drawing of part of Fig. 2 of Davenport and Bridges' patent." After making said drawing it was carefully compared with the drawing of the patent and it is a substantial duplicate thereof on an enlarged scale, save that the letter W has been applied to the semi-elliptic spring as shown, which letter does not appear in Fig. 2 of the patent, but is used in other figures as referring to said semi-elliptic spring.

I prepared the Defendant's Exhibit 'Proportional wheel bases' in accord with instructions to prepare a view showing the wheel bases of the patents to Buck, No. 112,897, Brill and Curwen, No. 610,118, Brill and Curwen, No. 627,898 and No. 627,900, Thyng, No. 4,276, Taylor, No. 507,855, and Davenport and Bridges, reissued, No. 183. This view was made with the assumption that the wheels shown in each of these patents were made to standard size, to wit, 30 inches across the tread and the wheel base or distance between the centres of the axles is in each case in proper proportion and in the proportion shown in the drawings of the respective patents, save that the wheel base of the patent to Buck was, by error, shown as being proportionately 7 feet 6 inches, whereas on measurements it was found to be only 7 feet 4 inches. In this respect the drawing of the Buck patent does not agree with the figures thereon. With this exception, that the drawing of the Buck wheel base should be shortened somewhat, all the views shown on this Exhibit have been found by careful measurement and comparison to be exact proportion of these shown in the patents.

I am of legal age.

ALLAN FOOSE."

## 207 Cross-examination by Mr. RAWLE:

X Q. 7. When did you enter and when did you leave the employ of the U. S. Patent Office?

A. I entered the Patent Office in the spring of 1891 and left in the fall of 1899.

X Q. 8. State your various capacities during that period?

A. I was appointed as a fourth assistant examiner, and was successively promoted, as a result of competitive examinations, to the ranks of third and second assistant examiner. While in the office, I was employed in the Examining Divisions having charge of applications relating to hydraulics and printing, respectively, having served about two and a half years in the former division and six years in the latter division.

X Q. 9. Did you have anything to do with classes or applications covering car trucks or related arts?

A. I did not examine applications relating to car trucks, nor did I examine any applications for improvements in any directly related arts, but I remember that on several occasions, I made some examinations in the art of car trucks to find, if possible, certain mechanical devices or elements which might be expected to occur in car truck construction, and thus became, to some extent at least familiar with the patented art in addition to the general knowledge of the practical art which I have gained by general observation, as promoted by natural inclination to observe and gain a knowledge of the general principles of mechanical devices.

X Q. 10. Then your experience in car truck patents while assistant examiner consisted in the fact that on one or more occasions, while looking up some hydraulic or printing application, you ran over the car truck patents in search of some specific device or element which might be useful to you in your hydraulic or printing work; is that correct?

A. That is substantially correct.

Recess.

X Q. 11. How often did you make these excursions into the patent truck art while you were in the employ of the Patent Office?

A. I couldn't say exactly, perhaps a half dozen times; sufficient to get a general knowledge of what mechanical elements might be expected to occur in such art, and incidently, to get a general understanding of the art as to the characteristic features of railway running gear.

X Q. 12. For use in your hydraulic and printing work?

A. Yes, it being understood that in both the hydraulic and printing work considerable machinery is employed involving mechanical features and elements which are common in a great many classes of invention, including car trucks, as for instance, brakes and springs.

X Q. 13. How long would one of these examinations into the car truck art take you?

A. I could not say exactly; perhaps an hour, perhaps half a day.

X Q. 14. Were there not a very considerable number of patents in this car truck class in the Patent Office?

A. Yes, but they were classified according to structure, and it was not necessary for me to go through all of the classes on any one examination, and I was usually aided in my investigations by the examiner or assistant examiner in charge of the class from whom I could get an idea of what was to be found in the patents more quickly than by an exhaustive examination of the patents myself.

X Q. 15. How many Letters Patent would you say there were relating to car trucks when you left the office in 1899?

A. I have no idea; there were a great many; I should say at least two thousand.

X Q. 16. Had you any specific practical knowledge other than that of a person of mechanical tastes and observing disposition, of car trucks, before you entered the Patent Office?

A. I cannot say that I had.

X Q. 17. Have you had any such knowledge since you left the Patent Office and up to your employment in this case?

A. If you mean by "practical knowledge" actual practical personal experience in designing or constructing car trucks, I should answer your question in the negative, but if you intend to include by the expression quoted, practical knowledge gained from conversations with those having knowledge of the practical art such as would be gained for instance in the preparation and prosecution of applications for patents relating to such matters, I would answer your question in the affirmative.

X Q. 18. What patents have you solicited on trucks?

A. I do not remember that any of the applications which I had in charge have eventuated in patents. The applications which I handled related to compressed air motor trucks for street cars which were filed on behalf of a New York company which I believe has since become defunct and the applications allowed to abandon.

X Q. 19. Is that all?

A. It is so far as I remember.

X Q. 20. Have you now stated all your practical experience with car trucks and investigations of the patent car truck art?

A. No. I remember that when a young man before entering the Patent Office, I visited the railroad shops of the Grand Rapids & Indiana Railroad at Grand Rapids, Michigan, and there observed the manufacture of railway car trucks, among other things, and in that way, gained a fairly good knowledge of their construction and became sufficiently interested to make me perhaps more than usually observant of car trucks during the succeeding years. In addition to other connections with the art already stated, I have examined, in addition to the patents which I have testified about herein, numerous other patents relating to car trucks, all of the patents, I believe, which were set up in the defendant's answer in this litigation, and all the patents that were involved in the litigation between the parties in this suit or their predecessors in the North Jersey case on these same patents in the case of Brill and Brill against Peckham Manufactur-



ing Company *et al.*, in the Southern District of New York also involving these same patents.

X Q. 21. Have you now stated everything as inquired in X Q. 20?

A. No, I remember that I had occasion to visit the car shops at Elkhart, Indiana, I believe it is, where car trucks were being built and there observed their construction. This was during the period of my employment in the Patent Office.

209 X Q. 22. If you have anything else on this subject, please state it now, and bring it down to date?

A. I do not at the present time think of any other experience in this line that would materially affect my qualifications.

X Q. 23. Up to the present date?

A. Yes.

X Q. 24. When did you first begin your real work of preparation for this examination?

The question is objected to as being manifestly improper and incompetent.

A. When I first began to observe the construction of car trucks. If you mean to inquire when I first began to read up the patents which were shown me in connection with this litigation, my answer is the eighth day of this month. This is Friday, the 19th.

X Q. 25. How many hours did you spend on this preparation before you began to testify.

Same objection, and further as bordering on the frivolous.

A. I should say about forty or forty-five hours, including about four hours that was spent at the Railway Exhibit in Washington, where I took particular occasion to carefully examine the car trucks there shown. This experience should have been included in my previous answers, particularly in my answer to X Q. 20.

X Q. 26. This Exhibit covered steam railway truck practice entirely, did it not?

A. No, but the steam railway exhibits were much in preponderance over the electric railway exhibits.

X Q. 27. What types of electric railway trucks did you see there?

A. The types I observed were the pivotal swing bolster type. If you mean by "what types" to refer to what makes, I will say that I did not observe particularly what makes the trucks were except that I did not observe any trucks involving the subject-matter of the patent in suit, nor any corresponding to the defendant's truck here in controversy.

X Q. 28. Is there any difference between the requirements of steam car trucks and electric railway car trucks in practice? If so, state them.

The question is objected to as being incompetent, and improper cross-examination, and as calling for knowledge of the use of car trucks in respect to which the witness has stated his qualifications.

A. The general requirements of railway trucks used on steam and electric railways are the same and, aside from the fact that provision

must be made in such of the car trucks used on electric railways as are provided with motors to adapt them to receive the electric motors and communicate the power thereof to the wheels of the trucks and to the cars carried thereon, the differences are such as relate to matters of degree, and particularly to the differences in the weights carried by the trucks, and in the differences of degree in the curves commonly employed in modern steam and electric railways. It seems that as to the weights to be carried, and possibly,

210 also as to the degree of curvature in the tracks, the modern electric railway practice corresponds more nearly to the steam railway practice as it existed from thirty to sixty years ago than to steam railway practice as it exists today, and, as a consequence of this, the sizes and proportions of the trucks and the character of spring connections between the truck frames and the car bodies which were common in steam railway car trucks employed in former times, are now being adopted in the car trucks employed on electric railways. This is shown by the fact that the truck constructions here involved in litigation are substantially the same, as to the construction and relative arrangement and operative relations of the parts, as certain of the car trucks found in the art of some thirty to sixty years ago, and exemplified, for instance, in the Buck, Davenport & Bridges, Thyng and Romans patents.

X Q. 29. Can you state any further differences?

A. There is this difference as to the requirements of car trucks employed on modern steam and electric railways not mentioned in my preceding answer, to wit, the construction of the electric railway car truck must be such as not to carry the floor of the car as high above the rails of the track as is permissible in modern steam railway practice, one step only being used between the level of the rails and the floor in the car in electric railway cars, whereas, two or more steps may be employed in modern steam railway passenger cars. But here again the modern electric railway practice is more in accord with the former steam railway practice, this similarity being an incident of the fact that in former times, steam railway rolling stock was not made as heavy, and was not required to carry as great weights as is the case in modern steam railway practice, the proportions of the parts and the magnitude of the loads carried in the older steam roads being more nearly the same as modern electric railway practice than modern steam railway practice.

X Q. 30. Is that all?

A. That is all that occurs to me just now.

X Q. 31. I gather from what you have just said that it took a great many years for the steam railway truck art to grow into its present practically standardized condition. Is that correct?

A. The present condition of the steam railway truck art is undoubtedly the result of a gradual development or growth which has taken place along with the gradual development or growth of the industries of the country and the gradual development or growth of railway transportation necessitated thereby. I cannot say that the present condition of the steam railway truck art is standardized any more than was the steam truck art of former times, except in

matter of degree. It appears that when the comparatively recent and perhaps more rapid development in electric railways took place, the steam railway standards of former times again became available and have been, in a measure at least, adopted by the electric railway car truck builders.

X Q. 32. Do you mean to say that the Thyng truck, the Buck truck, the Beach truck, and the Davenport & Bridges truck or any of the others that you have been discussing in your examination in chief, constituted a part of the "steam railway standards of former times." I emphasize the word "standard."

A. That would appear to be so, as far as I have been able to determine from the patents which I have examined, at least so  
211 far as the character of the connections between the car body supporting bolster and the truck frame shown in the Buck, Davenport & Bridges, Romans and Thyng patents are concerned. I cannot say that I have observed anything in the patents that would lead me to regard the Beach construction as a standard.

X Q. 33. You have referred to electric street railway practice as bringing the car body nearer to the ground than in the modern steam railway practice. What construction of the former did this bring about?

The question is objected to as being improper cross-examination, the witness having been called to testify only as to the relation between the patents in suit and the specific claims thereof to the prior art and to state the similarities and differences between the constructions in suit.

A. I cannot see that it has brought about any novel construction. The construction of the old Thyng patent, for example, is obviously as well adapted for supporting the floor of the car body at a low level, as is the construction of either truck shown in the patents in suit or the defendant's truck here involved in suit.

X Q. 34. Do you know what different types of pivotal street railway tracks are today in use throughout the country and which of them preponderate in extent of use?

Same objection.

A. Not having traveled throughout the country, and not having taken the occasion to look the matter up from other sources, I cannot say that I do.

X Q. 35. Can you state briefly what the maximum traction truck is as known in the trade?

Same objection, and notice is given that at the proper time a motion will be made to tax the costs of this part of the examination against complainants.

A. Yes. The maximum traction truck, I believe, is a four-wheeled truck in which the wheels carried on one axle are considerably larger in diameter than the wheels on the other axle, the truck being so connected with the car body that the greater part of the load is carried on the larger wheels, to which the power is supplied.

X Q. 36. Will you state, if you know, what practical requirements of the practical electrical practice has brought the truck here in controversy into quite general use?

Same objection and notice, and further objected to because the question is misleading, assuming that the truck "here in controversy has gone into quite general use."

A. The trucks here in controversy were produced, I believe, to meet the requirements of a modern suburban or interurban electric railways which have developed so rapidly in the last few years and the practical requirements of which, as to the running gear at least, correspond so nearly to the requirements of the former steam railway practice; that is to say, the provision of a car truck which is capable of carrying a moderate load without too great shock or jar at  
1212 a speed of from twenty to thirty miles an hour, and over tracks which have relatively sharp curves and are not in a very perfect condition, the comparisons being made with the modern steam railroads wherein the tracks are generally constructed with little degree of curvature at any point and are kept up in a good smooth condition, and wherein the weights carried are much greater than in the early steam road practice and the modern suburban electric railroad practice.

X Q. 37. Is that your best answer to my last question?

A. That is my answer to your question as I understand it.

X Q. 38. Assume as a well known fact that, prior to about 1897, the maximum traction type of truck was largely in use and was in fact the only pivotal truck in anything like general use, can you state what requirements of the business were not met to the satisfaction of electric street railway men by the traction truck, and to what extent, the truck here in controversy has met and satisfied such requirements?

The question is objected to as being manifestly incompetent and improper cross-examination and as dealing in mental assumptions and not in facts either proven or otherwise, and the same notice is given.

A. As I understand the matter, the maximum traction truck was produced principally to meet the requirements of city street railway practice wherein the curves in the track are very sharp and the considerations of maximum acceleration, in accelerating the cars to overcome as far as possible, loss of time resulting from frequent stoppage, ability to climb short steep grades, capability of carrying extreme loads at times, and of meeting similar requirements incident to city traffic, were of more importance than considerations of speed, avoidance of shock or jar while running at comparatively high speed over imperfect tracks, economy of track wear, and similar conditions incident to interurban or cross country traffic. When the great development in interurban electric railway traffic took place, which I believe began in real earnest about 1897, the maximum traction truck, as one would naturally expect, had to give way to a form of truck better adapted for the interurban travel and, as one would

naturally expect, the type of truck which had proven itself to be suitable for the purpose in the former steam railroad practice, was adopted and was, I believe, quite generally adopted. I observe in this connection, that the maximum traction truck is still very generally used in city traffic, and is almost universally used in this city and in Brooklyn upon cars under which pivotal trucks are employed.

X Q. 39. Why are maximum traction trucks almost universally used in New York and Brooklyn under cars with pivotal trucks?

Same objection and notice.

A. I have no personal knowledge of the motives which underlie the universal use of these trucks in New York and Brooklyn.  
213 but the obvious reason would seem to be that such trucks are best adapted for the service in those cities.

X Q. 40. Have you read the expert testimony of Joseph P. Livermore in the North Jersey case and his deposition in the Brill vs. Peckham case in the Southern District of New York?

The question is objected to as being clearly incompetent and improper, neither of the records referred to having been touched upon in the direct-examination of the witness, and the same notice as before is given. Furthermore the witness is instructed not — answer if he so desires.

A. I think I have read part of his direct-examination in the *prima facie* case of the North Jersey suit. I have not read his affidavits in the suit in the Southern District of New York.

X Q. 41. Have you read the testimony and deposition of Phillips Abbott in those two cases?

A. Only a part of the testimony in the North Jersey case.

Complainants' counsel offers to defendant's counsel an inspection of certain full size car trucks made under the Thyng patent and now at the J. G. Brill works at Philadelphia, testimony as to which was given in the North Jersey case. This offer is made before the closing of defendant's proofs.

Notice is given *as* that testimony as to such trucks and their operation will be given in rebuttal.

Complainants' counsel here objects to any of the copies of patents offered on behalf of defendant, so far as the same were intended to prove the respective dates of filing of the applications therefor, on the ground that proof of such date is irrelevant, immaterial and inadmissible.

Counsel for defendant refers opposing counsel to the stipulation in the case relevant to his objection; and objects to such objection on the ground that it is not timely or in any other respect well taken.

Adjourned to Monday, May 22nd, same time and place.

MONDAY, May 22, 1905.

Same time and place.  
Appearances as before.

Re-direct:

R. D. Q. 42. Please consider the following testimony of Phillips Abbott, defendant's expert, in the suit of John A. Brill vs. The North Jersey Street Railway Company, and state whether you agree with the same, making whatever observations with reference thereto may seem proper to you?

"I am clearly of the opinion that the claims of the patent in suit, No. 627,898, which involve the employment of extensible or spring-links in combination with other parts, each and all of them embody merely an aggregation of elements which have been used in great variety and in all sorts of combinations, in car trucks and  
214 analogous structures for a long time prior to Mr. Brill's invention; and that the elements perform in the several combinations of the claims the same functions that they did in the old art structures; that they are in construction practically the same; that their coactive relationship with the other parts is substantially the same; and that in the combinations of the claims, they perform their individual functions solely as in the old art; and that their operation is in no wise modified so as to produce any new or different result from that which they produced in the old art. Therefore, the outcome of the combination described in these claims, in other words, their result in operation, is nothing but the sum of the functions of these old elements which have been selected from the old art and grouped together."

(I quote the foregoing from Page 99, of Vol. 1 of the Record of the above mentioned suit in the Circuit Court of the United States for the District of New Jersey.)

Objected to as immaterial and irrelevant.

A. I entirely agree with the testimony of Mr. Abbott and would say in addition thereto that the same statement is true as to Claims 13, 14, 15 and 17 of Brill patent No. 627,900 here in suit, as well as to the claims referred to by Mr. Abbott of Brill patent No. 627,898, the first Brill patent here in suit, which obviously include Claims 13 and 81 more directly involved in the present controversy.

Aside from the fact that the combinations set forth in Claims 13 and 81 of the first Brill patent, and in Claims 13, 14, 15 and 17 of the second Brill patent, excepting possibly some minor details of construction specified in the claims of the latter patent, are clearly and completely disclosed in the prior art, and particularly in the Buck, Davenport & Bridges, and Haskins patents, these combinations amount to nothing more than a mere assemblage or aggregation of elements which have been used in great variety and in various combinations in car trucks and similar constructions found in the art prior to the patents in suit. The Thyng patent, for example, obviously and admittedly, I believe, discloses every feature of the combination set forth in each of the claims here in controversy,

with the exception of the links or hangers by which the semi-elliptic equalizer springs are suspended from the car truck frame. Links or hangers having the characteristics of construction and mode of operation set forth in various terms in the several claims, are old and common in the art and are used in the art in combinations which are either the same or analogous to the combinations of the claims in suit. Such links or hangers are found in combinations which are substantially the same as those specified in the claims, in the patents of Buck and Davenport & Bridges. They are found in combinations which are substantially the same or are analogous to the claims in suit, in the patents to Spencer & Stidolph, Haskins, Heffernan, Longstreth, Graham, the several patents to Peckham, Cooke, the patents to Brill & Curwen, and others.

When these old links or hangers are substituted for the links or hangers which are employed in the Thying construction for suspending the semi-elliptic bolster carrying springs from the side  
215 members of the truck frame, which at best is all that Brill did, they perform the same functions in substantially the same way and have the same mode of operation that they have in the combinations in which they are shown as being employed in the old art. The result of this rearrangement of the elements amounts to nothing more than the sum of the results or the functions of the old elements selected from the old art and grouped together.

R. D. Q. 43. Please consider the following statement of the gist of the invention of Letters Patent No. 627,898 to Brill, which I quote from the opinion of the lower Court in the suit of John A. Brill vs. The North Jersey Street Railway Company, which statement of the gist of the invention was urged by complainant in substantially the same phraseology in the complainant's petition for re-hearing which was denied in that suit and state whether you find this gist of invention embodied in any of the Letters Patent to which you have referred heretofore as constituting the prior art?

"The gist of the invention of this patent principally lies in the construction and arrangement of a flexible spring connection between the truck-frame and the car-bolster, so adjusted as to provide relatively to the truck-frame a vertical spring movement, and also a longitudinal and transverse yielding horizontal movement, of the bolster supporting the car-body, thereby relieving the car body from shock, jerk or jar in the starting or stopping of the car or in its passage over inequalities or curves in the rails or track." (Transcript of Record, U. S. Circuit Court of Appeals, Third Circuit, Vol. 3, page 844.)

A. I find the subject-matter of this statement of the gist of the invention clearly and abundantly disclosed in the prior art. It is clearly and fully disclosed, for example, in the patents to Buck and Davenport & Bridges. The flexible spring connection between the truck frame and the car bolster disclosed in these patents is so constructed and adjusted "as to provide relatively to the truck-frame a vertical spring movement, and also a longitudinal and transverse yielding horizontal movement, of the bolster supporting the car body" and the construction and adjustment of the parts is such as



to relieve the car body from shock, jerk or jar in starting or stopping the car or in its passage over inequalities or curves in the rails or track, as has been fully pointed out in my direct-examination.

This subject-matter is also substantially disclosed in the patents to Spencer & Stidolph, Haskins, Longstreth, Heffernan and Graham, as pointed out in my direct-examination.

The subject of the gist of the invention as stated by the Court, moreover, is substantially embodied in the constructions disclosed in the patents to Thyng and Romans, in each of these patents, the flexible spring connections between the truck frame and the car bolster are so constructed and adapted "as to provide relatively to the truck frame a vertical spring movement, and also a longitudinal and transverse yielding horizontal movement, of the bolster supporting the car body." In each of these Thyng and Romans constructions, provision is clearly made for the transverse yielding horizontal movement of the bolster with relation to the car body and the connections shown are clearly adapted to provide for as  
216 much longitudinal yielding horizontal movement as can take place in the construction shown in the patents in suit and in the construction of the defendant's truck. The Thyng and Romans constructions are adapted to relieve the car body from shock, jerk or jar in the starting or stopping of the car or in its passage over inequalities or curves in the rails or track.

The subject-matter of the Court's statement of the gist of the Brill invention would also be embodied in, and substantially the same embodiment of that subject-matter which is specifically illustrated and described in the patents in suit, would be produced, by substituting for the forms of flexible hangers for the semi-elliptic springs disclosed in the Thyng and Roman patents, such flexible and elastic hangers as those found, for example, in the Spencer & Stidolph, Haskins, Longstreth, Heffernan, Graham, the several Peckham patents, Cooke, and the Brill & Curwen patents, to say nothing of the flexible and elastic hangers disclosed in the Buck and Davenport & Bridges patents, wherein the flexible and elastic hangers are employed for suspending the bolster carrying semi-elliptic springs from the car truck frame.

R. D. Q. 44. Please consider the following testimony of Louis T. Pyott, complainant's witness in the suit of John A. Brill vs. The North Jersey Street Railway Company, in connection with the construction of defendant's truck here in suit, as shown in Complainants' Exhibit "Photograph of Defendant's Car" and also state whether you agree with the same?

"X Q. 138. And if you wanted to put a heavier load on a truck it would be proper and practical to use a heavier spring?

A. A spring will carry with perfect safety when compressed to a straight line, even if it is weak, but you have no springing action.

X Q. 139. It becomes then practically an unbending rigid bar or beam?

A. Yes.

X Q. 140. And according to your experience an unyielding bar or beam could be used in place of such spring save that it would not

be so easy riding      The only difference would be as to the expected loss of elasticity?

A. It could be used but we put a spring in to get elasticity and we want it. We don't put a spring in for a foolish reason.

X Q. 141. In case you wanted to use a rigid beam and still wanted an elastic support, how would you get it?

A. You would have to add an additional spring in some other part of the truck." (Record, Circuit Court of the United States, District of New Jersey, Vol. 1, Page 583.)

A. This testimony I believe to be substantially in accordance with the facts, and I agree with it.

Referring to the defendant's truck here in suit as illustrated in the Complainants' Exhibit "Photograph of Defendant's Car" I observe that the semi-elliptic equalizer spring of the truck, although loaded, only with the weight of the practically empty car body, is compressed to a substantially straight line on its lower side, so that even when the car is not loaded, this spring forms practically an unbending rigid bar or beam, and will thus operate more like the relatively rigid equalizing bars of the Cooke and Brill & Curwen constructions than like such constructions as those shown in the Thyng and Romans patents, and contemplated in the Brill patents in suit.

With a substantially straight and rigid equalizer, such as that shown in the photograph and in the Cooke and Brill & Curwen patents, there is also little or no necessity for longitudinal movement of the hangers by which the equalizing bars are suspended from the truck frame, as there is little or no endwise play of the equalizers in operation, and this would be true even if the equalizer had more or less spring action, as it would simply play for a limited distance on opposite sides of a straight line connecting the lower ends of the hangers. That this is evidently intended to be the operation of the defendant's truck, is further shown by the fact that no provision is made for a free longitudinal movement of the hangers such as would be required if true semi-elliptic springs were employed.

Recess.

Complainants' counsel objects to R. D. Q. 42, 43 and 44, on the ground that these questions are not the proper subject-matter of a re-direct examination in that they place entirely new matter in the record which was not incorporated either in the direct or cross-examination of the witness.

R. D. Q. 42, is objected to as being leading and the same objection is made to R. D. Q. 44.

Complainants' counsel asks counsel for the other side to stipulate that these objections may have the same force and effect that they would have had had they been interposed before the answers to the respective questions to which they apply.

Defendant's counsel reply- that he is unable to accede to the proposed stipulation. In partial explanation, he will say that, had these objections, although he believes them to be wholly irrelevant

and improper as well as untimely, been placed upon the record when the various questions were asked, he would immediately have closed his re-direct in order to avoid all controversy and recalled the witness. Inasmuch, however, as he only has two or three more questions in contemplation, he will continue with the re-direct instead of formally closing and recalling the witness.

Counsel for the complainants reply- that Mr. Francis Rawle, of Philadelphia, Pa., is senior counsel in charge of this case for the complainants, and that he has been physically present at the taking of a portion only of defendant's proofs. At other times, it was agreed between counsel for the defendant and Mr. Edwards, who represented the complainants in the absence of Mr. Rawle, that objections to any part of the testimony might be made by Mr. Rawle to any testimony taken in his absence with the same force and effect that these objections would have had, had they been made at the time the question was asked to which the objection referred.

Counsel for the complainants understood and still understands, that this agreement holds. In view of this understanding, he did not enter the objections at the time the questions were asked  
218 but refrained from doing so until he could have a conference with Mr. Rawle, who is now in Philadelphia, and who has not been present at the taking of testimony today. This conference was had at the lunch recess over long distance telephone and in view of this conference, counsel for the complainant- entered these objections.

Counsel for the defendant is again asked, in view of the foregoing, to permit these objections to stand with the same force and effect that they would have had, had they been interposed at the time the questions were asked, to which they apply.

Defendant's counsel states that the only agreement between counsel with reference to objections was made in contemplation of the absence of Mr. Rawle during the direct testimony of the witness, and accordingly, counsel now present misunderstands the matter, Mr. Rawle was present during the cross-examination and at the close thereof, was notified that the testimony would proceed today. It was never the intention of counsel for defendant to permit two or more of complainants' counsel to withhold objections pending conference and thereafter introduce them as a result of collaboration. Either Mr. Rawle, or a representative has been present throughout the taking of all defendant's proofs to date. Accordingly the above request is refused. If, however, complainants' counsel desires to have the re-direct closed and thereafter the witness recalled, although it is a purely formal matter, it is immaterial to defendant's counsel and he will do so. He cannot, however, accede to a stipulation to accept objections as timely, which in point of fact, are untimely.

Complainants' counsel states that he "has nothing to say" and accordingly defendant's counsel proceeds with the redirect-examination.

R. D. Q. 45. Please consider the following testimony of complainants' witness, Walter S. Adams in the suit of John A. Brill vs.

The North Jersey Street Railway Company, and state whether you agree with the same.

"Q. 11. State whether or not you consider motor suspension and location as being parts of the problem of truck structure and construction? A. The motor suspension is a part of the truck construction and is generally furnished with the truck, and I am familiar with the various styles of suspension that are used; both the details and their operation." (Record, Circuit Court of the United States, District of New Jersey, Vol. 1, Page 619.)

Objected to as improper re-direct-examination.

A. I agree with the witness in his statement that motor suspension is a part of the truck construction, as this is obviously the fact, it being understood that the question and answer relate to the construction of motor trucks for electric railways.

R. D. Q. 46. Have you read the various documents in the suit of John A. Brill vs. The North Jersey Railway Company?

Same objection.

A. I have read parts of certain of such document, including the published "argument of Edmund Wetmore and a supplemental brief on behalf of complainant."

R. D. Q. 47. Please consider the following quotation from the printed argument specified, upon the cover of which appears the names "Joseph L. Levy" and "Francis Rawle" "Edmund Wetmore of Counsel" and state whether you agree with the same?

"The defendants then come down to the Brill & Curwen patent, which preceded the patent to Mr. Brill, as they claim, and I shall treat it as in the prior state of the art. I agree with Mr. Duell that the disclaimer in the patent puts it in the prior state of the art." (Page 31.)

Same objection. This statement is further objected to as being entirely immaterial and irrelevant and as in no way binding upon the complainants.

The statement is further objected to as being no part of the record in the aforesaid North Jersey case, and also objected to as being mere argument of counsel and not within the proper province of an expert deposition.

The question is further objected to as being an attempt to place irrelevant matter before the Court in the guise of a question. If the defendant desires to prove what anyone said on any occasion, this should be proved by a witness who heard the remark, or by the person who made it.

A. I have read the statement quoted and I must agree with both Mr. Wetmore and Mr. Duell that the disclaimer referred to and which I understand to be that contained in lines 119 to 133 inclusive of page 2. of the patent in suit No. 627,898, acknowledges the construction of the application referred to in the disclaimer and in the Brill & Curwen patents Nos. 610,118 and 610,119 both of which eventuated from said application, as a part of the prior art with

respect to the Brill patents in suit. This fact not only seems obvious from a reading of the disclaimer, but it was established and made authoritative by the decision of the Court of Appeals in the case referred to, when the Court said with reference to the disclaimer referred to:

"It is a solemn concession of priority in favor of Brill & Curwen. The filing and issue dates of the Brill & Curwen patents show *prima facie* their priority over Brill, and we find no satisfactory evidence to rebut that *prima facie* showing. But the admission of the disclaimer settles the question of priority in favor of Brill & Curwen. Patent No. 610,118 to Brill & Curwen must be taken as part of the prior art."

It seems obvious that the Brill & Curwen patent No. 610,119 must also be regarded as part of the prior art as the application upon which this patent was granted was divided out of and originally formed a part of the application which is referred to in the disclaimer in question.

By COMPLAINANTS' COUNSEL: Answer objected to as being a mere legal argument in addition to the other objections raised against the question.

220 R. D. Q. 48. If your knowledge of the records in the case of John A. Brill *vs.* The North Jersey Street Railway Company is sufficiently specific, please state what Letters Patent heretofore referred to by you as constituting part of the prior art, were neither set up in the answer in that case nor offered in evidence, and accordingly were not before the Court upon final hearing?

Objected to as not being proper subject-matter for redirect-examination, and also as immaterial and irrelevant.

A. Neither of the following patents were before the Court on final hearing in the case referred to:

Davenport & Bridges, Railroad Carriage, No. 183 reissued Dec. 3, 1850.

Overbagh, Equalizing Bar for Railway Car Trucks, No. 104,876, dated June 28, 1870.

Buck, Railway Car Truck, No. 112,897, dated March 21, 1871.

Beach, Railway Car Truck, No. 173,257, dated Feb. 8th, 1876.

Defendant's counsel offers in evidence a copy of the order denying the petition for re-hearing of complainant-appellee in the suit of John A. Brill *vs.* The North Jersey Street Railway Company, and the same is marked "Defendant's Exhibit Order Denying Complainant's Petition for Re-hearing."

No cross-examination.

JOSEPH H. FREEMAN.

Adjournment taken until Thursday, May 25th.

Same time and place.

STATE OF NEW YORK,  
*City and County of New York,*  
*Southern District of New York, ss:*

I, John A. Shields, United States Commissioner in and for the Southern District of New York acting as Examiner, hereby certify that the above named witness, Joseph H. Freeman, was by me first duly sworn to testify the truth, the whole truth and nothing but the truth; that his deposition was reduced to writing upon a typewriter in the presence of said witness, and was read over to him, and by him subscribed in my presence and in the presence of counsel for complainant; that the opposing parties were represented by counsel during the taking of said testimony; that said deposition was taken pursuant to the annexed notice, at the office of Warfield & Duell, 220 Broadway, New York, N. Y., beginning at 11.00 A. M. on the 15th day of May, 1905, and continuing as set forth; that I am not connected by blood or marriage with either of said parties, nor interested, directly or indirectly in the matter in controversy.

In witness whereof, I have hereunto set my hand and affixed my official seal this 20th day of June, 1905.

[SEAL.]

JOHN A. SHIELDS,  
*U. S. Commissioner, Southern District*  
*of New York, As Examiner.*

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NEW YORK, May 25th, 1905.

Met pursuant to adjournment.

Appearances: Francis Rawle, Esq., for Complainants; Warfield & Duell, for Defendant.

Counsel for defendant offers in evidence Patent Office copies of the following United States Letters Patents:

No. 472,724, dated April 12, 1892, issued to W. Boughton; No. 455,990, dated July 14, 1891, issued to J. Taylor; No. 507,855, dated October 31, 1893, issued to J. Taylor; No. 507,050, dated October 17, 1893, issued to J. Taylor; and the same are marked respectively "Defendant's Exhibits, Boughton 1892 Patent;" "Defendant's Exhibit, Taylor 1891 Patent;" "Defendant's Exhibit, Taylor 1893 Patent No. 1;" and "Defendant's Exhibit, Taylor 1893 Patent No. 2."

Counsel for complainant states on the record that at the close of the testimony on Friday, May 19th, at half-past five o'clock, defendant's counsel stated that he would or might ask a few questions on re-direct examination of the witness Freeman at the following session on Monday May 22nd, complainants' counsel having a court engagement in Philadelphia on Monday which required his attendance there, and being unwilling to delay the case, although offering to attend on Saturday, if desired, and assuming, as he might, that only questions proper for re-direct examination would be put to the witness on Monday, and understanding, also, that counsel on both sides had agreed that objections to questions put in his absence, could be entered of record at the next session, now enters of record

the following objections to questions put to the witness Freeman from R. D. Q. 42 to the end, as follows:

To R. D. Q. 42. Objected to as inadmissible, immaterial and irrelevant; also as leading; also because the question contains quoted matter which is not in evidence; also as not proper for re-direct examination.

To R. D. Q. 43. The same objections (except that the question is not leading).

To R. D. Q. 44. The same objections (except that the question is not leading).

To R. D. Q. 44. Same objections as to R. D. Q. 42.

To R. D. Q. 45. Same objections as to R. D. Q. 42.

To R. D. Q. 46. Same objections as to R. D. Q. 42.

To R. D. Q. 47. Same objections as to R. D. Q. 42.

To R. D. Q. 48. Objected to as inadmissible, immaterial and irrelevant; also as calling for secondary evidence; also because the record referred to is not in evidence; also as improper for re-direct examination.

Counsel also objects to the answer of the witness to R. D. Q. 42, so far as it concerns the following: "the Thyng patent, for  
222 example, obviously and admittedly, I believe, discloses every feature of the combination, &c." to the end of that sentence.

Counsel also objects to so much of the answer to R. D. Q. 47 as quotes from "the decision of the Court of Appeals" in the North Jersey case, and so much of the answer as relates thereto.

Counsel objects to the offer in evidence of a copy of the order denying the petition for rehearing of complainant-appellee in the North Jersey case.

Counsel for complainant gives notice of a motion to strike out all the matter objected to, tax the costs thereof against the defendant in any event.

Counsel for defendant replies that in the face of such a flood of unlooked for objections, which are not only unexpected but untimely, in addition to being in other respects improper, he hardly knows at what point to begin an answer.

The re-direct examination referred to was in all respects proper, particularly in view of the fact that counsel for complainant was represented throughout and accordingly had every opportunity to object had he seen fit so to do; and, in view of the fact that counsel for defendant, just prior to R. D. Q. 45, offered, in order to avoid any possible questions of the propriety of the character of the re-direct, to close said re-direct immediately and recall the witness, to which complainants' counsel replied that he had nothing to say and did not care what procedure was followed.

It is not possible to understand how counsel for complainants could have had the understanding which he mentions as to the matter of objections entered at any time, in view of the discussion before R. D. Q. 45, and it is suggestive that no reference thereto was made until after a telephonic conversation between Mr. Rawle and his representative, Mr. Edwards, during the taking of said re-direct.

It may also be noted that an opportunity for cross-examining the



witness was given after closing the re-direct, and, in respect to the objections to quoted matter in the questions, Mr. Edwards carefully compared every quotation with the original before it was placed upon the record, counsel for defendant having stated that it seemed hardly necessary, in order to get a few facts connected with the North Jersey case upon the present record, to put some 2,000 pages of that record in evidence. He now suggests, that, if there is any question in the mind of counsel for complainants as to the correctness of the quotations, or of the facts quoted, he may now have an opportunity to compare the originals with the quotations, or may offer the record of the North Jersey case in evidence, without objection, and print the same at complainants' expense, should the same appear desirable, or he is offered a stipulation, as far as defendant is concerned, relieving from that duty.

The specific objections to the re-direct examination are improper and untimely and carry their own answer.

Complainants' counsel states that his objections will stand whether or not the quotations are accurate and whether or not the entire matter from which the quotations are made be offered in evidence and duly proved.

223      LOUIS M. SANDERS, a witness produced on behalf of the defendant, having been first duly cautioned and sworn, in answer to interrogatories propounded to him by counsel for defendant, testifies as follows:

Q. 1. Please state your name, age, residence and occupation?

A. Louis M. Sanders; age, 42; residence, Orange, N. J.; occupation, patent lawyer.

Q. 2. Please state what experience you have had tending particularly to qualify you to testify as to Patent Office history of letters patent No. 627,898, "Complainants' Exhibit, Complainants' Parent Patent" here in suit?

A. I was appointed assistant examiner in the United States Patent Office in May, 1894, and in August of the same year was assigned to Div. 34, in which division applications for letters patents covering inventions relating to railway rolling stock were, and I believe now are, examined. A portion of my duty as assistant examiner in division 34 was to examine applications relating to car trucks of various kinds. During this time, that is, the time from the date of my appointment until the date of my resignation, in the year 1903, I examined a large number of applications relating to car trucks, among which was the application which resulted in the patent here in suit, to which you have referred.

Q. 3. Did you also examine an application resulting in letters patent No. 627,900, "Complainants' Exhibit, Complainants' Divisional Patent" here in suit, and what, if any, was your connection therewith?

Objected to as inadmissible and irrelevant.

A. My recollection is that I examined the application which re-

sulted in this patent No. 627,900, as well as at that time all other applications relating to car trucks.

Q. 4. I hand you Defendant's Exhibits, "Defendant's Exhibit File Wrapper and Contents of Brill Parent Patent," and "Defendant's Exhibit, Letters from File Wrapper of Brill Secondary Patent," and ask you to state whether the initials "L. M. S." appearing at the top of the letters embodied in both exhibits, are yours and whether they indicate that the respective office actions were by you.

Same objection; also because the witness, being uncertain as to whether he "examined the application that resulted in the patent in suit No. 627,900," cannot refresh his memory from printed matter or from anything except the actual record bearing his own individual writing. Also because the second of the printed exhibits handed to him is inadmissible for reasons stated when it was offered.

Complainant's counsel is reminded that the exhibits in question when offered in evidence were not objected to for lack of certification; and that the witness' remembrance is not "uncertain."

Complainants' counsel makes no objection to the copy of the file wrapper because it is uncertified, when offered for admissible purposes, but not for such an extraordinary and inadmissible purpose as the present, as to which not a certified copy, but only the  
224 original record in the patent office would be available to refresh the witness' memory. The same objection will be taken to a similar of a certified copy.

Defendant's counsel states that the exhibits are not referred to for the purpose of refreshing the witness' memory, there being no necessity for that, but as cumulative or corroborative evidence of the precision of the witness' memory.

Complainants' counsel states on the record that at the proper time he will move to strike from the record the discussions of defendant's counsel which have no proper place here, and tax the costs thereof against the defendant in any event.

A. In making an office action upon any application it was the custom of the stenographer in division 34 to place at the head of each office letter the initials of the examiner who dictated the letter. This usually was placed in the upper left-hand corner of the office letter and the stenographer's initials in the upper right-hand corner. When the letter was typewritten, it was the custom to submit the same to the examiner for correction and, when corrected, the examiner attached his initials usually at the lower left-hand corner of such letter. The typewritten initials are found upon the original letter and also upon the copy retained by the Patent Office. The written initials are found only upon the copy retained by the Patent Office. The principal examiner of the division also attached his name in full to the office copy of such letters. It was my custom in each of such actions to attach my initials "L. M. S." to each office action made by me. In the certified copy of the Parent case I note that the initials are shown as typewritten. In the copy retained by the Patent Office I am quite sure they will be found as written with pen and ink. However, the applications which resulted in these

patents required so much time and such diligent search that their general treatment is still fresh in my mind, so fresh that I might say at this time something like three or four years since I have seen the references which were used in the treatment of the "Parent" case, I could, I believe, make sketches and give names of the references used, as, for example, the patent to Thyng, the patent to Haskins, and others.

Q. 5. Please state your practice while in the Patent Office, with respect to making searches for references, as well as, generally, the character and extent of your work, particularly with respect to complainants' patents in suit while pending in the form of applications?

A. After having read the specifications and claims of an application—

Objected to as inadmissible and irrelevant.

—so as to become thoroughly familiar with the structure of the device claimed, it was my custom to search among the related classes, to which the alleged invention belonged, in division 34, for patents illustrating devices of the same or of a similar character. This search was not confined, in many cases, to the sub-classes under

225 Railway Rolling Stock, for the reason that in division 10, under the class of Carriages and Wagons, many analogous structures could be found. In fact, an examiner was never confined in his search to any particular class and frequently called upon other divisions for assistance in locating a patent disclosing some particular subject which he was seeking. In the case of the patents in suit such outside search was made and developed certain references from the class of Carriages and Wagons, which were used in connection with patents from the class of Railway Rolling Stock, as anticipations of certain of the claims under consideration.

The answer is objected to as inadmissible and irrelevant; and notice of motion to strike out and tax is given.

Q. 6. Please state what, if any, difficulty or difficulties existed, particularly in your division, with respect to making thorough and complete searches for references; and also whether you consider that the searches made by you were as complete as desirable.

Same objection as to Q. 5.

A. Division 34 was known in the Patent Office as one of the heavy divisions, that is, all of the main classes during my incumbency were very active and a large number of applications were handled. A rule of the Patent Office required that all work as near as practicable should be kept within thirty days. In order to perform the required work, it frequently became necessary to take applications from the desk of one assistant examiner and give them to another assistant examiner for examination. Under such circumstances, two assistant examiners were making searches through the same sub-classes for references and it frequently happened that copies of patents from the same sub-class were in the hands of two assistant

examiners, and sometimes in the hands of the principal examiner. So that in the limited time at the disposal of the various assistants it was possible for a particular patent to escape the attention of an assistant examiner making a search in any particular sub-class. Examiners' copies of patents are supposed to be returned to their proper sub-classes when their use is no longer needed, and in the distribution of such copies, it frequently happened that they were misplaced, so that subsequent search in any particular case might fail to disclose them. It was the custom in division 34 to have lists of all patents in the various sub-classes and to compare the copies of patents in all of the sub-classes with these lists at stated periods for the purpose of replacing any patents which had come up missing. Frequently, two or three patents from a single sub-class would be found to have disappeared completely or to have been placed in some other sub-class. These are some of the difficulties in the way of making an exact search in the limited time at the disposal of the assistant examiners.

Such searches as I made while in the Patent Office were always as complete as the circumstances of any particular case seemed to require, and yet I may say that they were frequently less complete than I could desire because of my limitations as to time.

226 The same objection is made to the answer and the same notice given.

Q. 7. Please state whether the foregoing answer applies to the period of the pendency of the applications of complainants' patents here in suit?

Same objection.

A. It does.

Recess.

Q. 8. In this connection, will you please state whether or not you kept any record while in the Patent Office of the extent of your labors, and, if so, what?

Objected to as inadmissible, immaterial and irrelevant.

A. It is the duty of the clerk of each of the Patent Office divisions to keep a record of all the office actions made by each of the examiners. During the first four years of my incumbency, I kept a record of my own actions taken in the various applications which I handled. I recollect that the average number of actions which I made during these four years was over one thousand. When it is considered that each examiner is given thirty days annual leave and that there are some seven or eight legal holidays in the District of Columbia during each year, besides the Sundays, it will be seen that this yearly average of one thousand means something like four actions per day, in order to keep up the work assigned and to keep within the required dates. This, with the other disadvantages under which I was compelled to labor, as heretofore stated, fairly illustrates the work of examining patent applications.

Q. 9. Please state whether letters patent comprising Defendant's

Exhibits "Buck 1871 Patent," "Beach 1860 Patent" and "Davenport & Bridges 1850 Patent," were discovered by you in your searches for references for either of the applications resulting in complainants' patents here in suit or were cited by you in your actions in those cases. In addition to the patents named, you may state any other patents which have, at any time subsequent to such actions, been called to your attention, if you recollect any, which were not discovered or cited by you.

Same objection.

A. My recollection of the actions taken in the patent which has here been called the "Parent" patent, is that such of the claims as covered broadly the idea of supporting the bolster of the truck upon semi-elliptic springs, said springs being in turn suspended from the truck frame by means of links, were rejected on the patent to Thyng, which was a very old patent. I think the first office action developed the Thyng patent. In a subsequent action a patent to Haskins was found by me in one of the sub-classes under Carriages and Wagons, which disclosed the specific form of spring link. At the same  
227 time that I discovered the Haskins patent, I recollect having found a number of patents in which the end of a semi-elliptic spring was yieldingly suspended from some portion of the running gear of the vehicle. One in particular I recall as illustrating a semi-elliptic spring supported by means of a spiral spring, but because the Haskins patent illustrated a closer approximation to the spring link of the Brill application, the other references from Carriages and Wagons were discarded and the Haskins patent relied upon alone in connection with the Thyng patent.

As to the Buck patent, the Davenport & Bridges patent and the Beach patent, my recollection is that they were never considered in connection with the claims of either of the Brill applications in question while they were pending in the Patent Office. At any rate, they were not cited, probably for the reason that a complete and sufficient anticipation was thought to be present in the Thyng patent taken in connection with the Haskins patent.

As to any other patents in this connection, to which my attention has been called, I do not now recall any by name.

Q. 10. Please state fully the patent office history of Complainants' Exhibit, Complainants' Parent Patent, confining your attention particularly to claims 13 and 81 thereof. You may refer to the file wrapper which is in evidence and to any other data which you may have.

Objected to as inadmissible; also because the file wrapper in question is the best evidence and secondary evidence in connection therewith is inadmissible; also because the question calls for the use of "other data which you may have."

A. In the copy of the file wrapper referred to which is before me, I find at the top of page 78, claim 13, original 15 of the amendment dated December 6th and filed December 7, 1897. This amendment was filed in response to a requirement to file a complete new draft of the claims because of misunderstanding and confusion in the matter of the claims then in the case. On page 95 of the same

file wrapper I find claim 83, which appears in the patent as claim 81. This claim 83 originally appeared in the amendment as claim 87. Reference to the office action dated December 24, 1897, and mailed December 27, 1897, discloses that claim 15 and claim 87, together with a large number of the claims of the application were rejected on the patent to Thyng in view of the patent to Haskins No. 530,023, November 10, 1885, (Carriages and Wagons, Spring gear, Side Bar, Cross) "the latter patent being cited to show the use of a spring link supporting a horizontal semi-elliptic spring, the spring link being considered in every respect the equivalent of the spring link shown by applicant, and in the same connection."

Subsequent to this office action the applicant's solicitor, Mr. Joseph L. Levy came to me in an interview for the purpose of securing a withdrawal of this rejection, and presented oral arguments as to why he thought the rejection to be improper. Inasmuch as I considered at that time the application of the references to be correct, I refused to give my personal consent to the withdrawal of the action, and, upon his persistence, I suggested that if Mr. Simpson, who was in charge of the division, consented to the withdrawal I would have nothing further to say. The matter was presented to Mr. Simpson and after considerable argument pro and con, Mr. Levy requested Mr. Simpson to allow the claims and to let him take his chances in the courts to sustain them. Finally Mr. Simpson acquiesced in this treatment of the case and I had nothing further to say. A reference to this conversation is made on page 106 of the file wrapper where a request is made for a reconsideration of a large number of claims rejected on the Thyng and Haskins patent, in view of a recent interview. It will be noted that no subsequent reference is found in this file wrapper to either the Thyng or the Haskins patent. I believe at that time and still believe, that claims 13 and 81 were fairly anticipated by the references cited against them. Subsequently, the application was placed in interference with another co-pending application.

The answer is objected to for the same reasons; also because it is an attempt to invalidate or in some way effect by the expression of the present opinion of the witness, who was connected with the transaction as a subordinate in the Patent Office, the validity of a solemn grant of the United States. The part of the answer referring to conversation with Mr. Levy and with Mr. Simpson is objected to as hearsay and as inadmissible and irrelevant. The answer is objected to as outside of the proper function of an expert witness, even if the witness had qualified as such. Further, objection is made to the next to the last sentence in the answer, beginning "I believe at that time" &c., as inadmissible and irrelevant for any purpose and particularly to affect in any way the grant of the United States government which is the foundation of these proceedings.

Q. 11. Referring to letters patent No. 627,900, "Complainants' Exhibit, Complainants' Divisional Patent," were the claims thereof, comprising claims 13, 14, 15 and 17, allowed in view of any understanding or statement by the applicant's solicitor with reference to their being drawn to the specie of the case or otherwise, and if so, what?

Objected to for substantially the same reasons as just given; as inadmissible and irrelevant; as asking for hearsay evidence; as an attempt to affect the validity of a United States grant by parole evidence. Notice of motion to strike out and tax is made.

A. At the time that Mr. Simpson consented to allow the series of claims in question in the "Parent" case, the same reasons were presented for the allowance of the claims in the divisional case inasmuch as they were drawn to proper divisional subject-matter. I suggested to Mr. Simpson at the time that consistent action required the allowance of the claims in the divisional application which had been rejected on the Thyng and Haskins patents. To this he gave  
229 his approval on the understanding that they covered proper divisional matter.

Same objection as to the answer and the same motion.

Q. 12. What was the practice in division 34 with reference to considering carriages and car trucks as belonging to analogous arts and citing patents on the former when pertinent as references against claims for improvements in car trucks?

Objected to as inadmissible and irrelevant; because the Patent Office practice is irrelevant to this issue, and because the subject is a matter for the cognizance of the court.

A. The class of railway rolling stock and the class of carriages and wagons were always considered while I was in the Patent Office as analogous arts, and it was common practice when a pertinent reference was found in the class of carriages and wagons, to cite the same against the claim for an improvement in car truck.

Q. 13. Referring to A. 9, wherein you state that patents to Buck, Davenport & Bridges and Beach, here in evidence, were not considered in connection with claims of either of the Brill applications in question, please state whether you remember ever having discovered these patents in your searches.

Objected to as irrelevant, immaterial and inadmissible.

A. I do not now recollect having used any one of the patents to which you refer in connection with any of the claims of either of the patents in suit to which you refer. The reasons for not considering them in connection with these cases was probably because the Thyng and Haskins patents were thought to be of such a character as to be complete anticipations and therefore the use of further references unnecessary.

Objected to because the speculations of the witnesses as to what was thought by him or any one else in the Patent Office are irrelevant to the issue and inadmissible. The same motions are made.

Q. 14. In going over the files in search of references, what is the practice with reference to closely examining every patent in the art, or otherwise?

Objected to as irrelevant and inadmissible to the practice of Patent Office examiners inquired of and *have* no relevancy to the validity of a grant of letters patent.



A. An examiner is supposed to be, and ordinarily is thoroughly familiar with every patent in the classes with which he has to do, so that in the ordinary examination he simply runs through the patents in the class in which he is searching and can tell at a glance at the drawing of a patent whether or not the anticipation which he is seeking is present in such patent. Under the ordinary pressure under which he works, this is made necessary and it sometimes happens that a pertinent reference may be overlooked for the reasons which I have already stated. In making the examination the examiner has a definite object in view, that is to find a certain number of elements arranged in substantially the same combination as called for by the claim upon which he is making the search, and when he finds such a combination in a particular patent, such patent is withdrawn for use in the further consideration of the case. Under the pressure, as I have said, under which the examiner frequently has to work, it is not improbable that he should overlook a reference which might be considered pertinent.

Same objection as to *answers* and same motions.

#### Cross-examination by Mr. RAWLE:

Complainants' counsel here repeats the objections hitherto urged; also objects to the entire deposition of the witness and gives notice of motion to strike the same from the record and to tax the costs thereof against the defendant in any event.

In view of the foregoing multitude of objections and notices, defendant's counsel reminds opposing counsel that the Patent Office history of patents in suit is invariably of the greatest value to the court and pertinent to the issues.

X Q. 15. You stated in answer to Q. 8 that you had an average of 1000 actions? How many of these were on car trucks?

A. As a rough estimate, during the time that I had charge of the class of car trucks. I should say anywhere from fifty to seventy-five per cent. were actions upon applications relating to car trucks.

X Q. 16. Did the same number of yearly actions approximately take place in the same remaining years of your incumbency, say from 1898 to 1903?

A. Probably not from 1900 on, for the reason that I had charge of other heavier classes requiring more time for each application.

X Q. 17. Approximately, how many separate truck patents were granted by the Patent Office during the first four years of your incumbency, 1894 to 1898?

A. Any estimate that I would give would be purely guesswork. I might say anywhere from 150 to 300, and possibly more.

X Q. 18. Approximately, how many during the rest of your incumbency from 1898 to 1903?

A. Possibly as many more.

X Q. 19. Was the great preponderance of them connected with electric railway practice?

A. I should say yes, for the reason that during this period electric railway propulsion was being rapidly developed, and therefore applications for letters patents covering some parts of the electric motor truck were very numerous.

X Q. 20. Was your duty as assistant examiner anything more than to examine a given application and to report to the principal examiner over you whether in effect you recommended the allowance or rejection of the application, or as the case might be with your reasons, but the principal examiner being vested with the sole  
 231 power to decide what action should be taken irrespective of your communications with him?

A. The responsible head of each division in the Patent Office is the examiner in charge of that division. All actions by assistant examiners are usually made after reporting the cases to the principal examiner together with such recommendation as the assistant examiner may deem proper in any particular case. If the principal examiner agrees with the assistant in his recommendation, the action is made accordingly, it always being in the power of the principal examiner to overrule the assistant and make such action as he, the principal examiner, may think proper and in accordance with the rules of practice irrespective of the assistant examiner.

Deposition closed.

LOUIS M. SANDERS.

STATE OF NEW YORK,

*City and County of New York,*

*Southern District of New York, ss:*

I, John A. Shields, United States Commissioner in and for the Southern District of New York, acting as Examiner, hereby certify that the above named witness, Louis M. Sanders, was by me first duly sworn to testify the truth, the whole truth and nothing but the truth; that his deposition was reduced to writing upon a typewriter in the presence of said witness, and was read over to him, and by him subscribed in my presence and in the presence of counsel for complainant; that the opposing parties were represented by counsel during the taking of said testimony; that said deposition was taken pursuant to the annexed notice, at the office of Warfield & Duell, 220 Broadway, New York, N. Y., beginning at 11:00 A. M. on the 25th day of May, 1905, and continuing as set forth; that I am not connected by blood or marriage with either of said parties, nor interested, directly or indirectly in the matter in controversy.

In witness whereof, I have hereunto set my hand and affixed my official seal this 20th day of June, 1905.

[SEAL.]

JOHN A. SHIELDS,

*U. S. Commissioner, Southern District  
 of New York, as Examiner.*

232 Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,  
 against

THE WASHINGTON RAILWAY & ELECTRIC COMPANY, Defendant.

NEW YORK, May 31, 1905.

Met pursuant to notice at the office of Warfield & Duell, Solicitors for Defendant, No. 220 Broadway, New York, May 31, 1905.

Appearances, same as before.

Counsel for defendant offers in evidence certified copies of the following documents:

(1) Order on mandate in the suit of John A. Brill and the J. G. Brill Company against Peckham Manufacturing Company *et al.*, in the Circuit Court of the United States in the Southern District of New York.

(2) Order dissolving Complainants' preliminary injunction in the suit of John A. Brill and the J. G. Brill Company *vs.* Peckham Motor Truck & Wheel Company *et al.*, in the Circuit Court of the United States in the Southern District of New York.

(3) Opinion of the Circuit Court of Appeals for the Second Circuit in the suit of John A. Brill and the J. G. Brill Company *vs.* Peckham Manufacturing Company *et al.*, reversing the order granting a preliminary injunction to Complainants.

The foregoing documents are marked respectively: Defendant's Exhibit, Peckham Mfg. Co. Order on Mandate; Defendant's Exhibit, Peckham Motor Truck & Wheel Company Order Dissolving Injunction; Defendant's Exhibit, Peckham Mfg. Co.—Opinion, Court of Appeals, Second Circuit.

Objection made to each of the above copies offered on the ground that the offer is irrelevant, immaterial and inadmissible; also because the copies offered are only parts of the entire record of the causes to which they respectively relate; also because the subject-matter of the offer is *res inter alios acta* and therefore irrelevant and inadmissible in the cause here pending.

Counsel for both parties stipulate that the following statements made by counsel on the record shall be stricken therefrom:

All the statements immediately following the answer to Q. 9 in the deposition of Complainants' witness, Walter S. Adams, and extending to Q. 10.

Also, the statements of counsel on pages 57, 58, 59, 60, 61 and 62 (except the last two lines of page 62), being the matter following R. D. Q. 20 of the deposition of James Rawle.

Recess.

233

Counsel for Defendants states upon the record that the Peckham Mfg. Co. has assumed the defense of this suit; assumed the defense of the suit of John A. Brill and the J. G. Brill Co. *vs.* The Peckham Motor Truck & Wheel Co. *et al.*, based upon the same two Letters Patents herein involved in the U. S. Circuit Court for the Southern District of New York; that The Peckham Motor Truck & Wheel Co. assumed the defense of the suit of John A. Brill *vs.* North Jersey Street Railway Co. in the U. S. Circuit Court for the District of New Jersey; and that the Peckham Mfg. Co. is the successor of the Peckham Motor Truck & Wheel Co., having purchased all the assets of the latter company, which is now defunct.

Complainants Counsel makes no objection to the above statement as to the defense of this suit by the Peckham Mfg. Co., but asks Defendant's Counsel whether the statement is intended to be broad enough to include the entire control of this case by the Peckham Mfg. Co. and of all the proceedings therein and to cover the idea that the Defendant's Counsel of record, who have appeared in the

cause at the taking of testimony, act herein on behalf of the Peckham Mfg. Co. and as its counsel in full control of the proceedings.

Complainants' counsel object to the above statement of defendant's counsel so far as relates to the case of John A. Brill and the J. G. Brill Co. *vs.* The Peckham Motor Truck and Wheel Co. pending in the U. S. Circuit Court for the Southern District of New York; also so far as it relates to the defense of the suit of John A. Brill *vs.* The North Jersey Street Railway Co. in the United States Circuit Court for the District of New Jersey. The grounds of such objections are that the statements of counsel, so far as objected to, are inadmissible and have no probative force and do not tend to establish the truth of any statement whatever; also because the said statements are irrelevant and immaterial. The motion is here made to strike the same from the record.

No objection is made to the statement that the Peckham Mfg. Co. is the successor of the Peckham Motor Truck & Wheel Co., having purchased all the assets of the latter company.

Defendant's counsel replies that, inasmuch as the Peckham Mfg. Co. is the maker of the alleged infringing trucks herein, in order to protect its customers, it has been compelled to assume the defense of the present suit, and it is accordingly obvious that it must control such defense.

With reference to the objection of opposing counsel to the statement of the fact that the Peckham Motor Truck & Wheel Co. assumed the defense of the suit of John A. Brill *vs.* The New Jersey Street Railway Co. in the United States Circuit Court for the District of New Jersey, counsel for defendant requests him either to deny such fact or admit it, inasmuch as the fact is sufficiently within his knowledge so that he stated in his brief, entitled "John A. Brill and the J. B. Brill Company *vs.* The Peckham Manufacturing Co. *et al.*," one of the suits above-named, on page 6 thereof, the

following, which is here quoted:

234 "It is not denied that the Peckham Motor Truck & Wheel Company built the trucks complained of in that case." (Referring to the North Jersey suit.)

"As is usually the case, the Railway Company called upon that company to defend the cause. It is admitted (Appellant's Brief, page 6) that it did so."

(Referring to counsel) "They now, however, fully admit it. \* \* \*" (Two last quotations, page 7).

The brief is now handed to opposing counsel for comparison and verification if such is desired.

Complainants' counsel is not under obligation to deny or admit any statement made on the record by opposing counsel; he objects to such statements as inadmissible and irrelevant and as to the same renews his objections and motion as above. He objects to the quotation from the brief of appellee's counsel as inadmissible. He, however, states that from the beginning of the case of Brill *v.* The North Jersey Street Railway down to the hearing thereof before Judge Bradford, in the Circuit Court, the defendant's counsel in the cause of Brill *v.* The North Jersey Street Railway Company persistently declined to admit that the Peckham Motor Truck & Wheel Company had assumed the defense in that case.

Defendant's proofs closed.

*Defendants Exhibits*  
*Filed March 14 1906*

No. 183.

REISSUED DEC. 3, 1850.

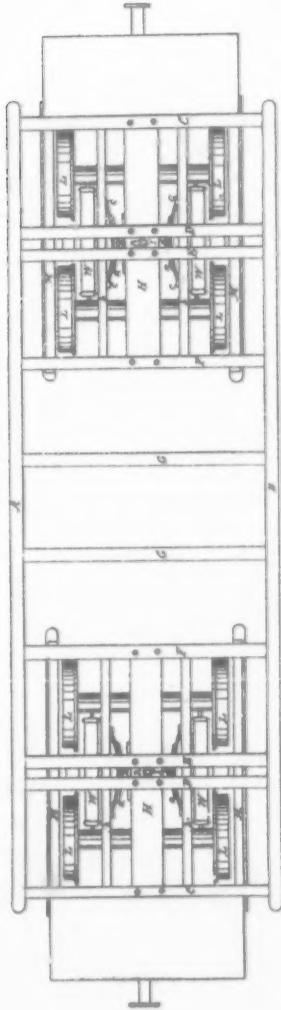
C. DAVENPORT & A. BRIDGES.  
 RAILROAD CARRIAGE.

4 SHEETS—SHEET 1.

*Fig. 2*



*Fig. 1*





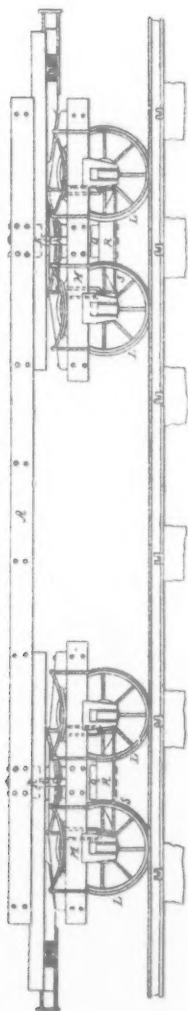
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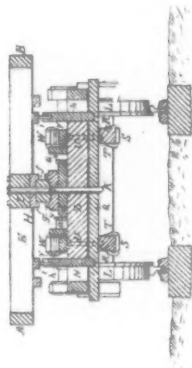
C. DAVENPORT & A. BRIDGES.  
RAILROAD CARRIAGE.

4 SHEETS—SHEET 2.

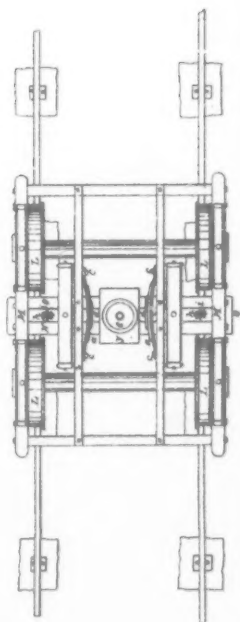
*Fig. 4.*



*Fig. 3.*



*Fig. 5.*





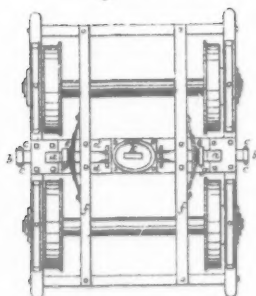
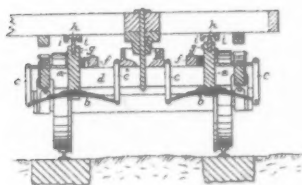
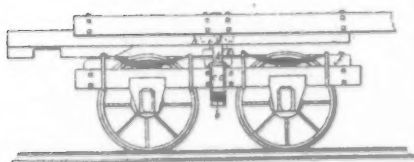
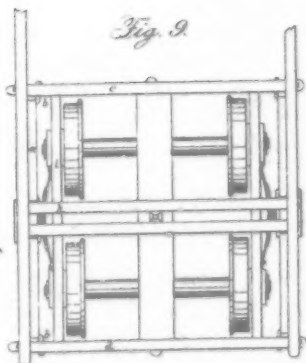
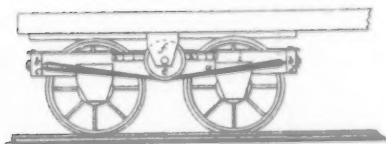


No. 183,

REISSUED DEC. 3, 1850.

C. DAVENPORT & A. BRIDGES.  
RAILROAD CARRIAGE.

4 SHEETS—SHEET 2.

*Fig. 6.**Fig. 7.**Fig. 8.**Fig. 9.**Fig. 10.*

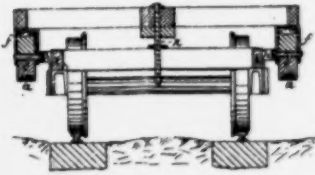
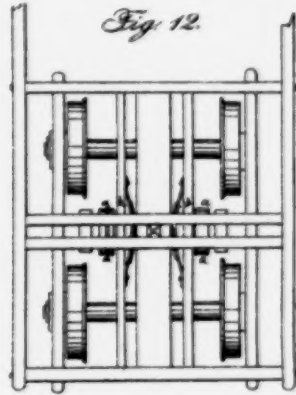
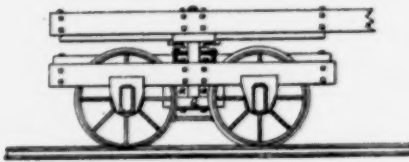
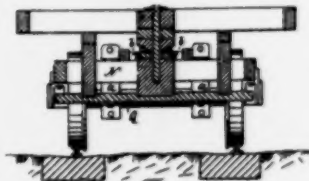
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No. 183.

REISSUED DEC. 3, 1850.

G. DAVENPORT & A. BRIDGES.  
RAILROAD CARRIAGE.

4 SHEETS—SHEET 4.

*Fig. 11.**Fig. 12.**Fig. 13.**Fig. 14.*



# UNITED STATES PATENT OFFICE.

CHARLES DAVENPORT AND ALBERT BRIDGES, OF CAMBRIDGEPORT, MASS.

## RAILROAD-CARRIAGES.

Specification forming part of Letters Patent No. 2,071, dated May 4, 1841; Reissue No. 183, dated December 3, 1850.

To all whom it may concern :

Be it known that we, CHARLES DAVENPORT and ALBERT BRIDGES, both of Cambridgeport, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Railroad Carriages, by which the inconvenience to passengers and liability of injury to the cars arising from the sudden lateral motion of the wheels on the rails is obviated; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, which, taken in connection herewith, form our specification, setting forth the principles of construction of our improvement (by which it may be distinguished from others of a like character) and such parts or combinations as we claim to be our invention, and for which we desire an exclusive privilege for fourteen years to be secured to us by Letters Patent.

Most persons who travel by railroad experience a continual repetition of sudden jars or shocks, arising from the sidewise movement of the flanges of the wheels of the car against the rails of the track, and so extensive are the evils of these frequent shocks, that besides being greatly to the discomfort of the passengers, preventing them almost entirely from reading while traveling in this manner, it is highly injurious to the carriages and axles, causing the joints and other parts to become loose and soon deranged.

The object of our improvement is to obviate the effects of the above lateral shocks by mechanism suitably arranged, and which we now proceed to explain :

FIGURE 1 of the drawings herewith presented represents a top view of the frame and wheels of an eight wheel carriage, (or "long car," as it is usually termed in order to distinguish it from the common short or four-wheel car,) the body being removed therefrom. FIG. 2 is a vertical longitudinal section of the above. FIG. 3 is a transverse vertical section taken centrally between either of the two axes of each set of four wheels. FIG. 4 is a side elevation of the frame and running machinery on which the carriage rests. FIG. 5 is a top view of the latter detached from the frame above the same.

The supporting frame, upon which the body

is placed consists of two side beams, A B, (see the different drawings,) united at suitable distances by transverse ties C D E F G G F E D C, whose ends are mortised into or otherwise properly secured to the beams.

It will be perceived by inspection of Figs. 1 and 2 that the second and third ties from each end, viz., D E, are placed at a small distance apart in comparison with the others. Under the beams C D E F is a central and longitudinal plank, H, extending from the first tie, C, to the fourth, F, and well secured thereto and to the central ties, D E, by bolts or otherwise.

As our improvement is connected with both systems of truck-wheels or both trucks, it will be sufficient to explain its application to either.

The ties D E are connected together in the center by a block, I, inserted between them, and resting on the top of the plank H, and through this block the long bolt K is passed, which connects the wheels to the carriage. The wheels L L L L are connected to the truck-frame M in the usual manner. The said truck-frame is rectangular, being suitably constructed for the purpose for which it is intended. The outer or side beams of the frame have two transverse beams, N O, extending between them, and situated at a suitable distance apart to permit the standards of a cross-beam or wide plank, Q, to play vertically between the same. The plank Q extends under the frame M and between the wheels, as represented in the drawings, and has two cross-bars, R R, Figs. 2, 3, applied at right angles to its under side. Metallic springs or plates S S are bolted to the under side of the bars R R, to the ends of which springs common shackles or loops T T are applied, from which shackles suspension-links U U or other similar contrivances extend upward, as seen in Figs. 2 and 3, and connect with the loops V V of common semi-elliptic springs W W, suitably applied to the top of the transverse beams N O, as seen in Figs. 1, 4. Two iron standards or planks, X X, FIG. 2, of sufficient width, are bolted to the opposite sides of the plank Q, and extend upward perpendicularly therefrom somewhat above the tops of the beams N O, as seen in the drawings, and are connected together at their tops by a strong iron plate or longitudinal plank, Y. A deep plank or standard,

See also following diagram marked p. 235 to 238

Z, also rests or is bolted upon the upper edge of the plank Q, its position being seen in Figs. 2, 3. The width of this plank Z is about the same as the distance between the beams N O, it being so arranged as to move vertically between the same. The cross-plate Y also rests directly upon the plank Z, as seen in Figs. 2, 3, 5. Two semi-elliptic springs, *a a*, Figs. 3, 5, may be suitably arranged on the inner sides of longitudinal beams *b b*, Figs. 2, 3, 5, their ends passing under staples *c c*, inserted in the sides of the beams *b b*, or being otherwise properly connected thereto, so as to support the springs and permit them to operate as required. The upright guiding plank Z has a shoulder, *d*, Figs. 3, 5, formed thereon on each side of the plate Y, each of which shoulders abuts or rests against the center of one of the springs *a*. The top of the center plate, Y, has a suitable circular step, *e*, or bearing cast thereon, which receives a circular pivot, *f*, projecting from a plate, *g*, applied to the under side of the plank H, the bolt K passing downward through the pivot and its step, as seen in the drawings. Two standards, *h h*, Figs. 3, 4, 5, are arranged on the plank Q, between the beams N O, outside of the springs W W, as seen in the drawings. Small vertical friction-wheels *i i* are placed in the tops of these standards, and small rail-pieces *k k* to rest on said friction-wheels, are bolted to the lower sides of the two beams D E.

From the above it will be seen that the carriage rests upon the plate Y and the friction-wheels, or, in other words, by means of the intervening parts, on the springs W W, so that its perpendicular movements are relieved by the said springs. The connection of these springs with the lower springs or plates, S S, on the cross-bars R R, by means of the suspension-links U U, admits a pendulous or lateral motion of the plank Q, and consequently the carriage is thus permitted to move sideways. When this takes place, one of the shoulders *d d* is pressed against the adjacent spring *a*. Therefore, whenever there is lateral motion of the wheels, so that their flanges strike suddenly against the side of the rail, any unpleasant effect of the same on the carriage and passengers is rendered imperceptible by the relief afforded by the springs *a a*, or any mechanical equivalent for relieving the shock and bringing the turning bearing back to its central position. The running machinery is permitted to adapt itself to curves of the railway by means of the circular step *e* and pivot *f*, and the carriages of the train are connected together in the usual manner by the common spring and buffing apparatus, which is represented in the drawings as applied to each end of the carriage-frame.

Figs. 6, 7, and 8 exhibit another disposition of the springs and other parts for relieving the shocks resulting from the lateral motion. Fig. 6 is a top view of the running machinery. Fig. 7 is a transverse section, and Fig. 8 is a side view of the same, with the carriage-frame

resting thereon. By this arrangement it will be perceived that the standards *a a*, Figs. 6, 7, and 8, upon which the carriage frame rests and in the tops of which are the small friction-wheels *g g*, as before described, are supported and secured upon the central part of the semi-elliptic springs *b b*, arranged transversely and between the wheels or under the cross-beams *d d*, and supported at their ends by the suspending-link *c c*, hung from upper hinged bearings applied to the top of the cross-beams *d d*. Springs *c c*, when used to relieve the side shocks, may be placed on the outer side of each of the parallel and longitudinal beams *f f*, so that their central parts shall rest against the inner side of the standards *a a*, and their ends bear against and be properly affixed to the outer sides of the beams *f f*. In this case each of the friction wheels *g g* in the top of the standards *a a* should play in a grooved block or plate, *h*, Fig. 7, applied to the under side of the carriage-frame, the sides *i i* of the groove serving as shoulders to keep the respective parts of the machinery in place while the carriage is running. This particular arrangement of the supporting springs *b b* requires that the step *k*, in which the pivot *l* of the carriage rests, as before described, and which in this instance is bolted to the top of the cross-beams *d d*, should be elongated transversely, as seen in Figs. 7, 8, instead of circular, so as to allow of the play or lateral movement of the running machinery under the carriage-body. Figs. 9, 10, and 11 exhibit another modification of our invention, the former figure representing a top view of the carriage-frame and parts under the same.

Fig. 10 is a side elevation, and Fig. 11 a transverse section, of the above. The frame of the carriage is here supported on strong leather thorough-braces, *a a*, Figs. 10, 11, placed on each side of the frame, and whose ends are supported by staples *b b*, properly secured to the ends of the cross-beams *c d*, Fig. 10. The carriage rests on these thorough-braces by means of the strong friction wheels or rollers *e e*, Figs. 10, 11, moving in bearings *f f*, applied to the under sides of the outer beams, *g g*, of the carriage-frame. Elliptic or other proper springs *h h*, Figs. 9, 10, 11, for aiding in relieving the side shocks, may be placed directly behind each of the friction or bearing rollers, or between them and the sides *i i* of the frame to which the wheels are attached. The springs are curved outward, as seen in Fig. 9, having their centers resting against the bearing of the friction-wheels and their extremities suitably attached to and resting against the sides *i i* of the wheel-frame. Now, as the thorough-braces permit the truck-frames or running machinery to move sideways independent of the carriage or carriage-frame, such springs, *h h*, will aid in counteracting the force by which the flanges of the wheels impinge upon the rails, and prevent any inconvenience to the passengers therefrom. When the wheels run over a curve in



the railway, they will easily adapt themselves to the same, for as the frame to which they are attached turns on the center bolt or pin, *k*, the rollers or wheels *e e* will move a short distance over the upper surface of the thorough-braces, and when the wheels pass from a curve to a straight line they will return to their former position.

In freight and many other cars the method above described of sustaining the carriage-frame by suspending-links connected with springs may be often dispensed with, and the suspending-links may be employed without springs, as will be seen by reference to Figs. 12, 13, 14, the former being a top view of the carriage-frame and running machinery under the same, while Fig. 13 is a side elevation, and Fig. 14 a transverse section, of the above. In this case the construction would be every way substantially similar to that exhibited in Figs. 1, 2, 3, 4, 5, and herein first described, with the exception that the springs *W W*, Figs. 2, 3, would be omitted, and the springs *b b* used or not, as circumstances might require, the plank *Q* being supported in position by suspending-bars *a a*, Figs. 13, 14, 12, applied to opposite sides of the central beams, one of which beams, viz., *N*, is shown in Fig. 14. The suspending-bars are suitably hung at their tops by proper supports applied upon the upper surfaces of the center beams, which supports are to be of such character as to permit these bars to swing or have a pendulous motion transversely—that is to say, in a direction perpendicular to the railway. They are also connected to the plank *Q* by a similar arrangement, so that the plank *Q* and the cross-beams will always be parallel with respect to each other during the vibratory movements of the former. The springs for aiding in counteracting the side shocks are represented at *b b*, Fig. 12.

Previous to our invention the "long car," as it is termed—that is to say, one composed of a car-body and two or more four-wheel truck frames (such a car having been, as we believe, invented in this country)—had its turning-bearing of its car-body made stationary upon the truck frame, the latter being capable of horizontal rotation independently of the carriage body or frame, but without any lateral play or movement of its turning bearing or contrivances which support the car-body on the truck-frame. After such a car had been in use, it was discovered by us that in order to obviate the injurious or unpleasant effect of shocks, as above mentioned, it was necessary to combine with the truck-frame (and not only with one truck-frame but with the other at the same time, in order to more completely produce the desired effect) some mechanical contrivance or contrivances which would not only allow the turning bearing or turning and supporting contrivance a lateral play movement or movements, independent of the truck-frame, wheels, and axles, but bring or remove it back to its central position after, or

immediately after, the lateral defective force had ceased to act. We were the first, as we believe, to apply such mechanism as hereinbefore described. The weight of the carriage-body or it and its load, by its or their gravitating power, would operate to depress the suspension-links to a vertical position after any lateral throw of the turning-bearing and carriage-body had taken place. Such weight would also operate to overcome or counter-balance the lateral deflection of the supporting-bearing as well as to gradually relieve the car-body and bearing from the injurious or unpleasant effects produced by the shock of the wheels against the rails. In connection with the pendulous links or their mechanical equivalents lateral springs we found might often be used to advantage to aid in removing the effects of the shock and restoring the turning bearing back to a central position.

We are aware that common carriages for common turnpikes or common roads have had their bodies connected to their springs by very short links or contrivances, which were used for the purpose of permitting the expansion and contraction of the springs, and which would allow the body to have a very slight lateral motion independent of the wheels and axles. In such cases, however, the construction of such carriages and the arrangement of the suspension and turning contrivances, wheels, and axles differed essentially from the railway long car on which our improvement has been made. We therefore by no means intend to claim the broad principle of suspending and giving a carriage-body a lateral movement independent of the carriage-frame which connects it with the wheels as or in any of the modes in which the same has been accomplished previous to our invention, but we confine ourselves to our method of accomplishing the same and of overcoming the difficulties hereinbefore mentioned, as well as others, as incident to railway cars of the kind known as the "long car." We would also remark that but one of the truck-frames of such a car may have our invention applied to it, but when it is applied to two of them at opposite ends of the car, there is a combined action of the two which tends to straighten the line of draft in a train of cars when running on a curve of the railway. They also conjointly operate to overcome or prevent other injurious effects not hereinabove mentioned.

We do not claim as our invention the making stationary the turning bearing or contrivance which support the railway "long car" or carriage-body on the truck-frame, and allows a horizontal rotary motion of the truck-frame independently of the car-body or frame, as this has been done before the date of our invention; but in order to obviate the effect of lateral shocks, as specified, as well as for sundry other purposes,

What we do claim is—

The connecting the said turning-bearing to the truck-frame of the above-described

kind, resting on four wheels or more, by a mechanism, substantially such as described, that shall not only allow such turning-bearing, independently of the wheels and axles, a lateral play, movement, or movements, in directions transversely of the carriage, but bring or move it back to its central position after the lateral deflective force has ceased to act.

In testimony whereof we have hereto set our signatures.

CHARLES DAVENPORT.  
ALBERT BRIDGES.

Witnesses:

R. H. EDDY,  
F. GOULD.

L. B. THYNG.

Car Truck.

No. 4,276.

Patented Nov. 18, 1845

Fig. 4.

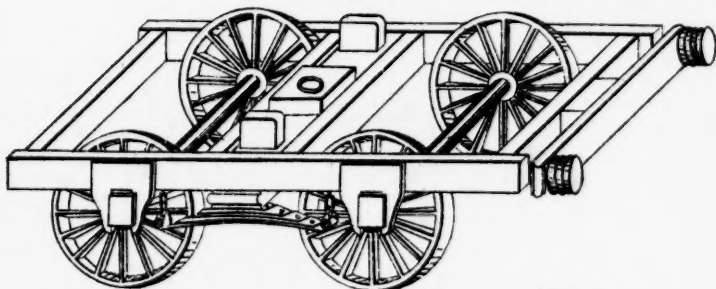


Fig. 3.

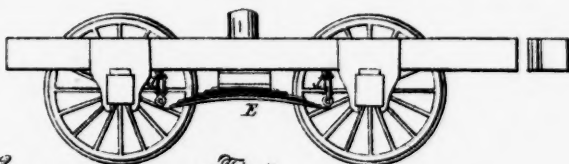
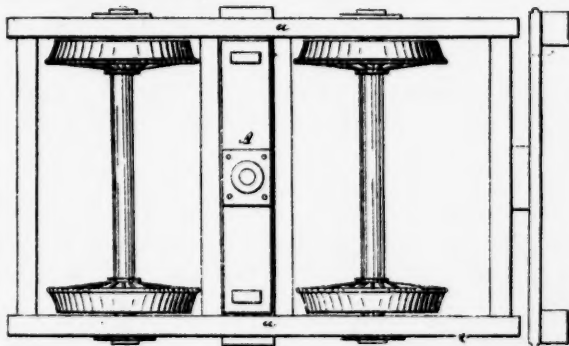


Fig. 2.



Fig. 1.



Witnesses:

*Saml. B. Thung*  
*Saml. B. Thung*

Inventor

*L. B. Thung*



245

LEVI B. THYNG, of Lowell, Massachusetts.

*Hanging Car Bodies.*

Specification Forming Part of Letters Patent No. 4,276, Dated November 18, 1845. Application Filed April 14, 1845.

To All Whom It May Concern:

Be it known that I, Levi B. Thynge, of Lowell in the County of Middlesex and State of Massachusetts, have invented a new and improved mode of hanging the Rail-Road car body to its carriage or truck; and I do hereby declare that the following is a full, clear and exact description.

The nature of my invention consists in supporting the car body on a flexible or equalizing bolster and suspending and governing the lateral motion of the same by shackles attached to the truck or carriage frame, thereby giving the car ease when in motion.

(Here follows diagram marked p. 243.)

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation: I construct a flexible or equalizing bolster (A, Fig. 1st) as shown by the accompanying drawing of two or more pieces of wood twelve inches wide and three inches thick, or of such thickness as is necessary to support the car body and its freight, the length of the bottom piece of plank (B, Fig. 2d), is two inches longer than the outside width of the truck frame, the other parts or plank (C, Fig. 2d), is of the same bolster — is placed nearly or quite in contact with the bottom surface of the truck frame, the other parts or plank (C, Fig. 2d), is of the same width and may be four inches shorter than the inside width of the truck frame. This allows the bolster to move endwise, and the car body to move laterally independent of the truck. The top part (c, Fig. 2d), of the bolster is tapered at the ends (b, b), sufficient to spring whenever there is an inequality of weight on the bearing points (c, c, Fig. 2d); these points (c, c) together with the coupling at the center, support the car body, (D, Fig. 2d); the bolster is fastened together by bolts passing through the center and securing the bottom coupling to the same. The bolster is supported by springs E, Fig. 3d, one on each end, these springs are immediately under and parallel with the truck frame, each end of these springs are supported and attached by shackles (d, d, Fig. 3d), about three inches long between joints, to studs (e, e, Fig. 3d), which are secured to the truck frame. The bolster is allowed to move endwise

freely between two girts in the truck frame. This motion which gives the car-body its lateral motion, is governed by the shackles, and will be more or less according to their length. The longer the shackles, the greater the *the* motion.

This arrangement is hanging and supporting the car-body gives it a very gentle and easy motion in passing over an undulating or zigzag Rail.

246 What I claim as my invention and desire to secure by letters patent, is the mode herein described of hanging the car-body and governing its lateral motion, that is to say—the spring bolster constructed, and governed — its motion substantially as herein described, in combination with the springs and shackles—the whole being constructed and operating substantially as herein set forth.

Lowell, Nov. 10th, 1845.

LEVI B. THYNG.

JOEL ADAMS.

JOHN A. KNOWLES.

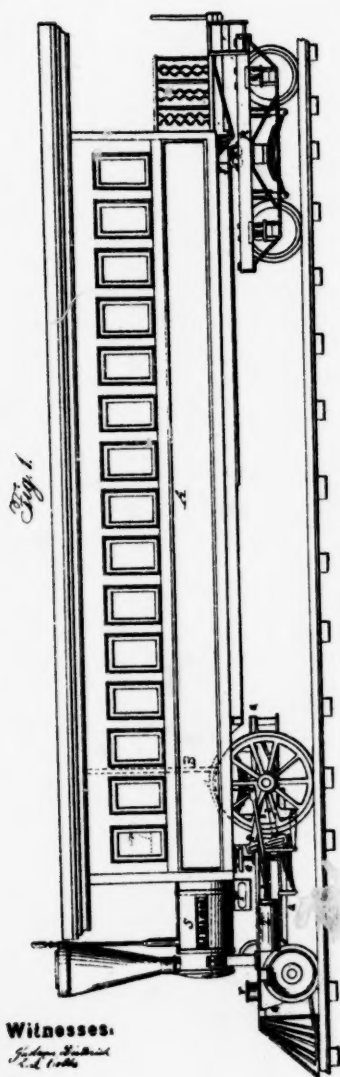
(Here follow diagrams marked pages 247 to 336.)

**2 Sheets—Sheet 1.**

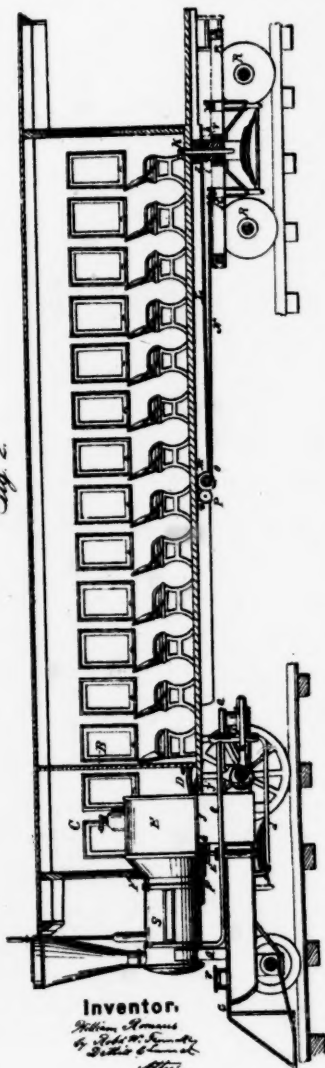
W. ROMANS.  
Dummy Engine.

No. 34,270.

Patented Jan. 28, 1862.



**Witnesses:**  
*Guilherme S. Monteiro*  
*L. A. Costa*



**Inventor,**  
William A. Adams  
by Robt. W. Jennings  
Denton & Co. Attorneys.

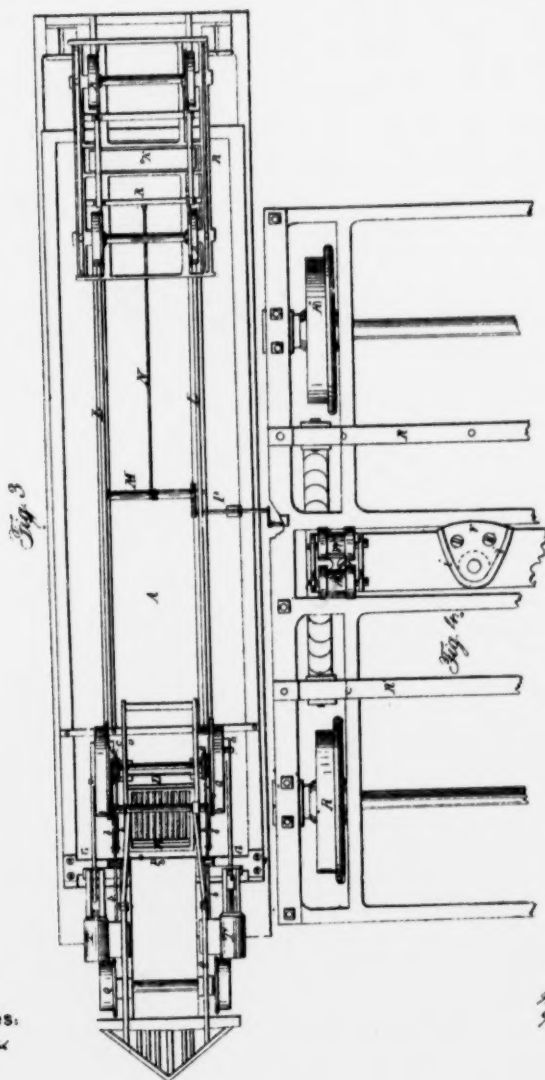




W. ROMANS.  
Dummy Engine.

No. 34,270.

Patented Jan. 28, 1862.



Witnesses:

*Frederick D. Doolittle*  
*A. L. Doolittle*

Inventor.

*William Romans*  
*By John W. Romans*  
*F. Doolittle & Co. Attorneys*  
*Wm. R.*



# UNITED STATES PATENT OFFICE.

WILLIAM ROMANS, OF COLUMBUS, OHIO.

## IMPROVEMENT IN LOCOMOTIVE-CARS.

Specification forming part of Letters Patent No. 34,976, dated January 29, 1892.

*To all whom it may concern:*

Be it known that I, WILLIAM ROMANS, of Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Improvement in Locomotive Railroad-Cars; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of my improved locomotive-car. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is an inverted plan of the same. Fig. 4 is a broken plan view of the rear truck of my improved locomotive-car.

Similar letters of reference in each of the several figures indicate corresponding parts.

The nature of my invention consists in the adaptation and use of a locomotive-engine which has a horizontal locomotive-boiler and a horizontal water-tank, in combination with long accommodation or long freight cars specially adapted for the said engine in such manner that the front of the car has its support on and at or near the center of the locomotive-truck frame and turns horizontally at said point, and at the same time the boiler, water-tank, locomotive-truck frame, and all other connections of the locomotive are free to move round in the path of a horizontal circle in turning curves of railroad-tracks.

It consists, second, in so arranging the water-tank, locomotive-truck frame, engine-cylinders, and valves of the locomotive adapted for sustaining the front of a long car that the eccentrics, link-motions, and valve-rods are located between the truck-frame and the inner faces of the driving-wheels, and thus a locomotive of great compactness, particularly adapted for the purpose to which I apply it, is obtained.

It consists, third, in so arranging the rear truck on a long car that it is capable of being moved while the car is resting upon it a greater or less distance toward the locomotive, and the long car thus enabled to turn short or sharp curves or corners with great ease and safety, and also adapted for being moved round on the small turn-tables provided for locomotives and short cars in ordinary use.

To enable others skilled in the art to make

and use my invention, I will proceed to describe its construction and operation.

In carrying out my invention I adopt an ordinary long car A, known among railroad men as "long accommodation passenger-cars," and separate about one-seventh of its length, at the front end, from the main portion, by means of a transverse vertical partition B, and thus form a small separate room C for the engineers to operate in and for carrying fuel. In the flooring of this room is cut a longitudinal opening D, which extends to the front edge of the platform, and is large enough to allow the upper portion of the fire-box of the engine hereinafter described to pass through it and also to permit the fire-box every freedom to play in the path of a horizontal circle in turning curves or corners of the railroad-track. The front part of this opening is closed in by a strong angular fender F, which has a curvature corresponding to the circular under portion of the horizontal locomotive-boiler, leaving sufficient room for vibrating and curving. Under the front end of the flooring of the engine-room a strong iron bolster G is screwed so as to be readily removed. This bolster has the head of a king-pin E fastened firmly in it. On each side of the central opening wheel-housings a a are provided, said housings being formed by cutting apertures through the flooring of the engineer's room and arranging boxes, which are hollowed in form of a segment, over the same, as shown.

At the rear end of the flooring of the car, on the under side, a strong bolster J is screwed or bolted, and through this bolster and the flooring of the car a king-bolt K passes. From the bolster at the point where the king-bolt passes through it a cylindrical stop or projection h extends downward, for a purpose hereinafter described, and from the bolster toward the front of the car rails L L extend a suitable distance—say, about to the center of the length of the car—said rails being attached firmly to the under side of the flooring of the car, as shown. At the center of the length of the car a transverse windlass-shaft M is placed, the rails serving as its bearings. This shaft has a chain or rope N attached to it, the rope being long enough to

Here follow diagram marked p. 247 & 248

extend from the windlass to the rear truck and attach to the same, as hereinafter described. On the end of the shaft M a cog-wheel O is secured, and into said wheel a pinion *o'* of a crank-shaft P gears.

The car thus constructed is mounted upon two trucks Q R, which are constructed and applied as follows: The front or locomotive truck carries a horizontal locomotive-boiler S and water-tank F, said parts being arranged upon and firmly fastened to it. The cylindrical portions of the boiler runs horizontally above the frame of the truck and extends back and connects to the dome and arch of the fire-box. The fire-box passes down inside of the truck-frame in front of the hind axle thereof. The water-tank occupies a horizontal position within the truck-frame directly under the boiler and forward of the fire-box. On the locomotive-truck two engine-cylinders T T, with steam-chests on their inner sides, are also arranged. These cylinders are located on the outside of the truck-frame, and the rods *b b* and eccentrics *c c*, which actuate the valves of the steam-chests, occupy positions outside of the truck-frame between the inner faces of the driving-wheels and the side bars of said frame, while the piston-rods are arranged outside of the driving-wheels. This arrangement of the parts economizes space and gives the whole space within the truck-frame for tank-room and also places the eccentrics in protected positions and convenient for being manipulated. The tank is supplied with water by means of a man-hole *v* at its front end, and the water from the tank to the boiler may be conveyed by means such as are commonly used—viz., pipes *d e* and a pump *f*—which are to be so arranged as to be capable of being thrown in and out of operation at the will of the engineer. The rear truck R is very similar in construction to the trucks ordinarily used to support cars. Its swinging beam, however, has attached to its top a king-pin plate V with a horseshoe-shaped flange *i* projecting up round the king-pin hole, which is formed in the plate and swinging beam. On each side of this plate grooved rollers W W are provided, said rollers being so located and arranged that they move longitudinally, while their supports swivel horizontally, and when the truck is applied to the car they receive the rails which are on the bottom of the car.

The car and trucks thus constructed are connected as follows: The removable bolster with king-pin attached and the fender at the front of the car are detached, so as to admit the fire-box and a portion of the boiler of the locomotive-truck into the engineer's room. The locomotive-truck is then backed up under the front end of the car, which at this stage is held elevated for the purpose by a jack-screw or other means. Before the locomotive is backed up the king-bolt is adjusted to its hole in the water-tank or in beams of the locomotive-truck frame, the bolster which car-

ries the pin resting transversely on said frame. The fire-box and dome portion of the boiler enters the engineer's room through the door and the opening in its flooring and is kept in position by means of the king-bolt. Round the fire-box are provided india-rubber aprons *j*, which overhang the flooring in such manner as to close the openings in the flooring around the fire-box or leg of the boiler and still allow the necessary vibrations and curvings. The removable fender and bolster are now fastened in their original positions to form the connection between the car and the locomotive, and that connection is such that no part of the locomotive is a fixture with the car, but every part is free to move independently of it, except so far as the locomotive and the car are connected by the king-bolt. Thus the locomotive and all its attachments are permitted to move round curves and corners in the path of a horizontal circle without being subjected to any of the strain which is due to the center or king bolt.

By having the fender and bolster removable the locomotive-truck, with all its attachments, can at any moment be run out from under the end of the car, and by using a horizontal locomotive-boiler the water-tank and doctor-pump can be so disposed that an exceedingly small space serves for accommodating them, and, further, no strain which is due to the center-pin comes upon the water-tank, boiler, or any of the parts necessarily used with a locomotive, as all the parts are wholly supported by the truck-frame. The engineer also is comfortably housed and nearly the rear half of the locomotive is covered by the flooring of the engineer's room, and the center of motion on which the engine depends is brought to or near the center of the locomotive-truck frame instead of being located at the extreme rear end thereof, and therefore the locomotive can turn much shorter curves, it only having to sweep the circle with one-half its length. It will also be seen that the rear portion of the engine is brought very compactly under the front part of the car as the hind wheels extend up into the housings a considerable distance, said housings being wide enough to allow the necessary movement in the path of a horizontal circle. The front locomotive-truck having been thus connected to the car, the rear truck is run under the rear end of the car and fastened by the king-bolt. When the connection is thus formed, the horseshoe-flange has its open end in rear of the king-pin, and the windlass-cord is hooked to one of the cross-beams of the truck. The car is now ready for use.

In the use of the car it often becomes necessary, in order to turn it completely round or sweep it round sharp corners or curves, to move the rear truck to the center of the length of the car. To accomplish this, withdraw the king-bolt and wind up the windlass-cord by

means of the crank and windlass shafts. Thus winding up the cord draws the truck under the rails on the bottom of the car to the desired position. When in said position, the longitudinal motion of the rollers and the horizontal swiveling motion of their bearings allows of the truck turning curves, said rollers and the rails maintaining the connection, and the bearings of the rollers serving as the axes of motion to the truck. To get the truck back to its original position, chock its wheels and start the engine slowly, so as to cause the car to move forward over the grooved rollers of the truck until the horseshoe-flange strikes the stop *h*, when the king-pin must again be inserted. Thus it will be seen that a long car is made as easy of management as a short one.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The manner, substantially as herein described, of adapting a locomotive and a car for direct connection with one another in such manner that all the connections of the locomotive are free to turn independently of the car, and that the weight of the front end of the car rests centrally or nearly centrally on the locomotive-truck, and thus is made available for steadying the locomotive on the track, while the center of motion of the locomotive is transferred from the rear end to the center

of the truck, all as and for the purpose set forth.

2. Making the front bolster *G* and also the fender *F* removable, substantially as and for the purpose set forth.

3. In combination with the construction and use of the devices as set forth in the first claim, the manner, substantially as herein described, of arranging the valve-rods, link-motions, and the eccentrics between the inner faces of the locomotive driving-wheels and the outer sides of the locomotive-truck frame, for the purpose set forth.

4. So constructing and arranging the car and the rear truck and connecting the same that the truck while the car is resting upon it may be moved a greater or less distance toward the locomotive, and when thus moved shall be free to turn curves, substantially as and for the purpose set forth.

5. The combination of the flanged plate *V* of the rear truck and the tubular projection *h* of the rear bolster *J* of the car, substantially as and for the purpose herein described.

WM. ROMANS.

Witnesses:

H. B. BIGELOW,  
CHAS. W. SMITH.

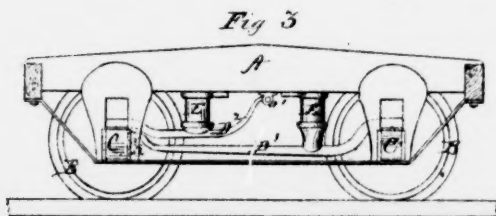
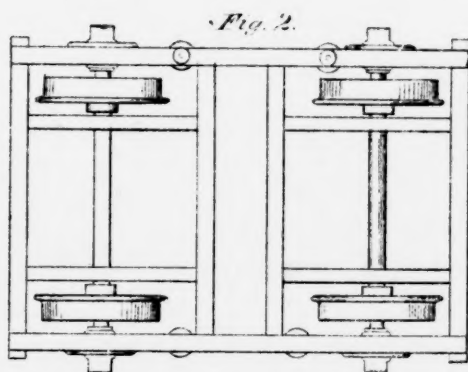
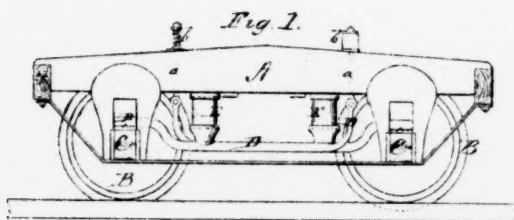




A. OVERBAGH.  
EQUALIZING BAR FOR RAILWAY CAR TRUCKS.

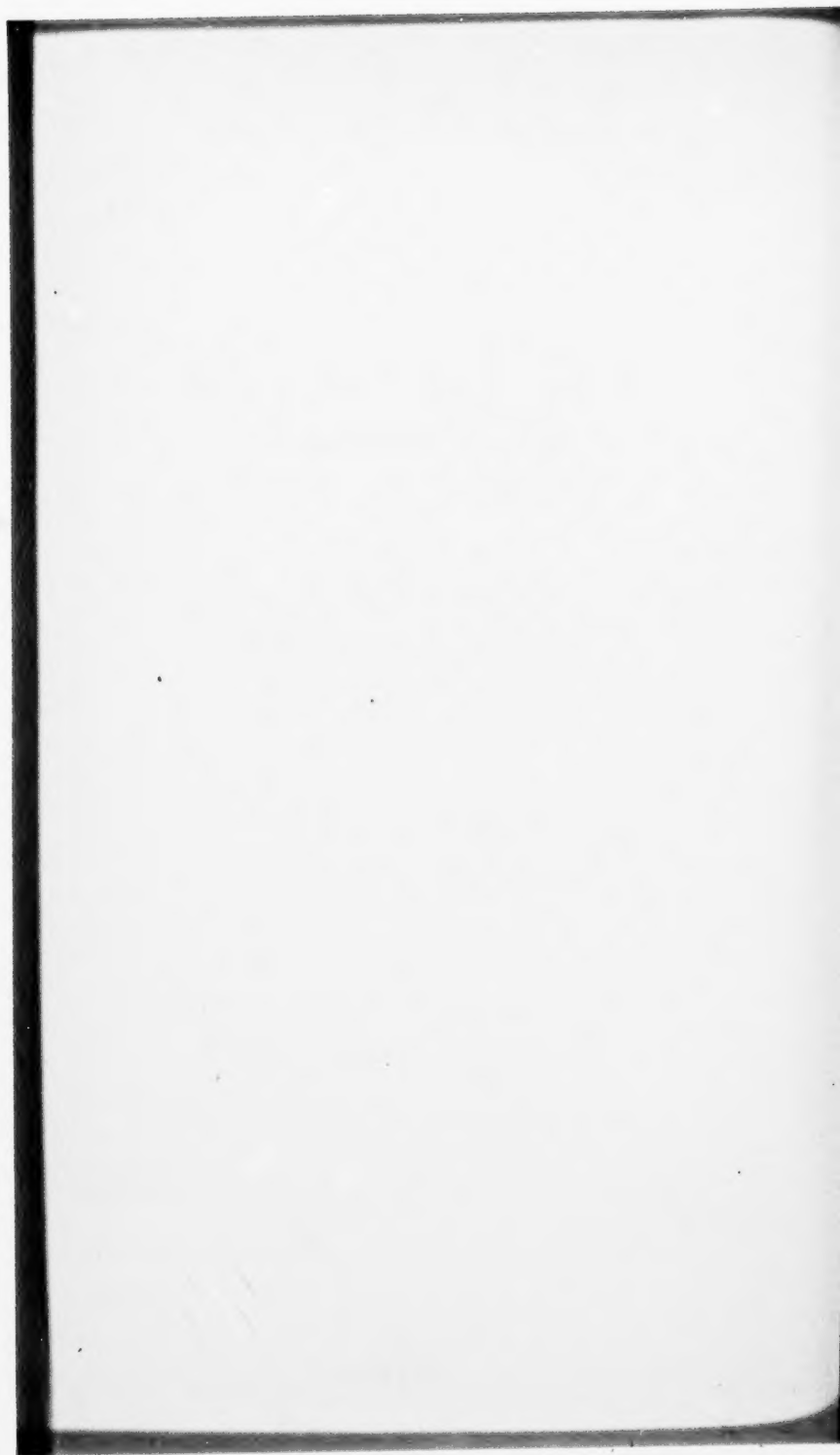
No. 104,876.

Patented June 28, 1870.



Witnesses:  
*L. A. Carter*  
*W. H. Mart*

Inventor:  
*Addison Overbagh*  
per *Alexandra Thomson*  
*attys.*



# United States Patent Office.

ADDISON OVERBAGH, SCRANTON, PENNSYLVANIA.

Letters Patent No. 104,876, dated June 28, 1870.

## IMPROVEMENT IN EQUALIZING-BARS FOR RAILWAY CAR-TRUCKS.

The Schedule referred to in these Letters Patent and making part of the same.

### To all whom it may concern:

Be it known that I, ADDISON OVERBAGH, of Scranton, in the county of Luzerne and in the State of Pennsylvania, have invented certain new and useful Improvements in Car-Trucks; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in the construction and arrangement of a "compensating equalizer for railroad trucks," as will be hereinafter fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a side elevation of a railroad car-truck with my compensating equalizers attached;

Figure 2 is a plan view of the same; and

Figure 3 is a side view, showing other modes of applying the equalizer.

A represents the frame of the truck;

B B, the wheels; and

C C, the journal-boxes for said wheels, all constructed in any of the known and usual ways.

On top of each journal-box C rests one end of the equalizing bar D, which passes under the fulcrum spring E placed on the under side of the frame.

The other end of the bar D is connected by joint-bolt a with the spring b on top of the frame, the bolt a passing through the same. The other bar on the same side of the truck crosses the first bar, as shown in fig. 1, it being hung and acting precisely in the same manner on the other journal-box.

The gum or other spring E, being the fulcrum for its bar D, can be set at such point in the radius as will best promote the riding of the car, and the use of the springs.

The particular advantage derived from the equalizing-bars D D is that the shock communicated to that end of the equalizer which lies directly over the journal, re-acts on the opposite end of said bar, and has the tendency to depress the opposite end of the truck, thereby compensating for this elevating of the end on which it receives its shock, and actually throwing the work on both springs when but one wheel is obstructed.

I do not confine myself to any particular kind of springs to use for those marked E and b, as any kind

of spring may be used which is deemed best adapted for the purpose. The mode of attaching the equalizer may also be changed, to conform to such kind of springs as may be employed.

The double equalizer may also be used in the manner shown in fig. 3. The bar D' resting on one journal-box C, passing under fulcrum-spring E, and its other end resting on a spring, i, fitted in the jaw or pedestal in which the other journal-box is placed. The equalizer on the same side of the truck to be hung in precisely the same manner, and passing the former.

In fig. 3 I have also shown the manner of hanging equalizers on four-wheel cars, which are generally too long to admit of any of the ordinary equalizing-bars. The equalizing-bar D' rests on the journal-box, passes under fulcrum spring E, and is attached to joint a'. The other journal-equalizing bar, &c., on the same side of the car or truck, to be hung in precisely the same manner.

The gain in this principle of hanging this kind of equalizer is the difference between the motion of the bar directly opposite its communication with the body of the car or frame, and the end which lies directly over the journal; that will also depend on the distance the spring fulcrum is placed relative to the ends of the bar.

In the drawing I have shown a single joint at one end of the equalizer, but it may be necessary to use a double joint, to allow for the motion of the bar.

Having thus fully described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the journal-boxes C C, bar D', fulcrum-spring E, and spring i, substantially as and for the purposes herein set forth.

2. The combination of the journal-box C, bar D', fulcrum-spring E, and joint a, all substantially as and for the purposes herein set forth.

3. The bars D D, having one of their ends resting upon the inclined journal-boxes C C, extending parallel to each other under the truck-beam, and under the springs E E, and hinged at their other ends to a bar, a, passing up through the truck-beam, and through the springs b b, all substantially as set forth.

In testimony that I claim the foregoing, I have hereunto set my hand this 23d day of February, 1870.

ADDISON OVERBAGH.

Witnesses:

C. L. EVERT,  
C. W. HARTLEY.

Here follow diagram marked p. 202



No. 112,897.

PATENTED MAR. 21, 1871.

C. S. BUCK.  
RAILWAY CAR TRUCK.

Fig. 1.

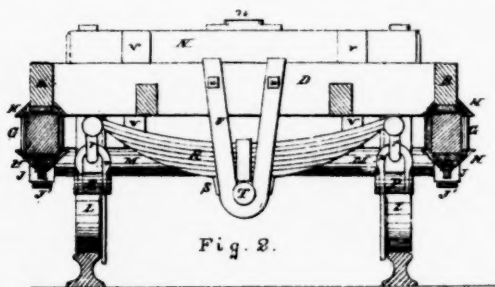
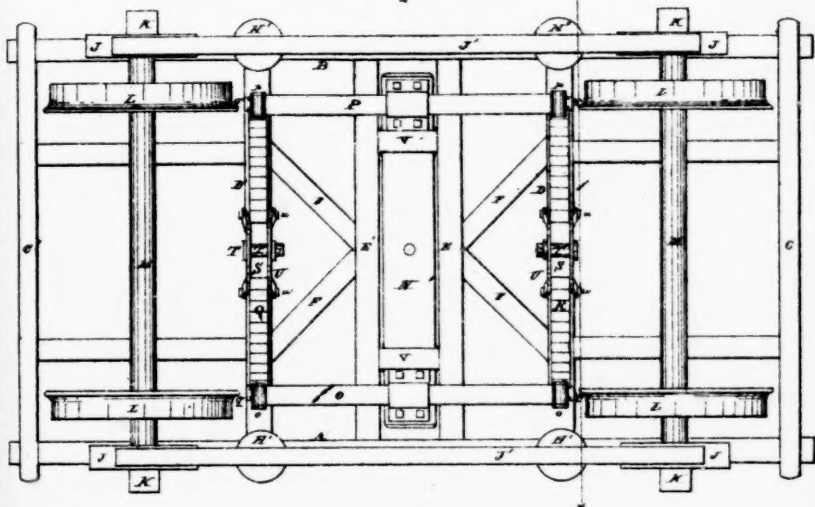


Fig. 2.

Attest  
Wm. H. Brewster  
Geo. L. Ewin

Inventor  
Chancey S. Buck  
By Knight Bros.  
His Attorney.



# United States Patent Office.

CHAUNCEY S. BUCK, OF ST. LOUIS, MISSOURI, ASSIGNOR TO HIMSELF  
AND JAMES LOVETT, OF SAME PLACE

Letters Patent No. 112,897, dated March 21, 1871.

## IMPROVEMENT IN RAILWAY-CAR TRUCKS.

The Schedule referred to in these Letters Patent and making part of the same.

I, CHAUNCEY S. BUCK, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Swing-motion Car-trucks for Railways, of which the following is a specification.

### Nature and Object of the Invention.

My invention consists in the firm attachment, beneath the ends of the bolster, of springs extending across at right angles with the bolster, and whose ends are connected by shackles to the ends of springs suspended from the intermediate cross-ties of the truck.

The object is to give an easy and durable combined spring and swing-motion, and to bring the bearing directly over the springs of the equalizer bar, so that there shall be no tendency to warp or strain the frame of the truck.

### Description of the Drawing.

Figure 1 is a bottom view of the truck.

Figure 2 is a transverse section at the line X-X, fig. 1.

### General Description.

A B are the pedestal or side timbers; and C C' D D' E E' are, respectively, the outside, intermediate, and center cross-ties.

F are braces, extending obliquely from center to the intermediate cross-ties.

G are the equalizer springs having caps H secured beneath the pedestal timbers, and steps I' secured to the equalizer bars I.

J are the pedestals, connected by longitudinal straps J'.

K are the axle-boxes.

L are the wheels; and

M, the axles.

N is the bolster; and

o, the center plate.

O P are half elliptical springs, firmly and rigidly attached at their mid-lengths to the lower side of the bolster, near the ends of the latter.

At the outer ends of the springs O P are loops or links o p, which hang in similar loops q r, at the outer ends of the springs Q R, which are attached at their mid-length to step-blocks S.

The step-blocks are supported on pins T, passing through the loops of the hanger straps U, which pass over the intermediate cross-ties, and are held in place by bolts u, or otherwise.

V are straps or stirrups, whose ends are attached to the tops of the center cross-ties E E', and which pass down between these cross-ties and the bolster, and beneath the latter. These stirrups answer two

purposes: first, as friction-plates, against which friction-plates r, attached to the sides of the bolster, impinge; and, second, as safety loops to sustain the bolster in case of the breakage of a spring.

My device admits of some modification without change of principle; for instance, in applying it to short freight trucks, rigid equalizer bars may take the place of the springs O P, such bars having the shackle connection o p q r with the springs Q R, so as to allow the swing of the bolster upon the shackle connection. This modification would not furnish so perfect an arrangement as that shown, but would answer the purpose for most freight-cars, and would constitute a better arrangement than that in ordinary use.

I prefer to make the springs Q R of sufficient power to hold up their ends on ordinary occasions in contact with the lower side of the intermediate cross-ties; but having sufficient flexibility to be brought into use as springs on any extraordinary occasions.

The bolster has constant and free capacity for swing-motion on the shackle connections of the springs and spring motion on the springs O P, and the equalizer springs G.

The upward movement of the wheel on passing over an inequality of the track first raises the end of the equalizer-bar resting on the journal-box; the strain then comes on the spring G, which is preferably located vertically beneath the end of the intermediate cross-tie D or D', which end may be raised, but never to the same extent as the wheel, and still-decreased movement of the spring step S is caused.

This step turns freely on its supporting pivot-pin T, so that there is no racking strain on the attachments, and as one end of the tie is raised, the spring Q or R is raised equally at both ends, and but a slight and equal movement is communicated to the springs O P, and in a still-decreased extent to the bolster.

The whole weight of one end of the car comes on the intermediate cross-tie D or D', directly from the springs O P Q R, and as the equalizer springs are nearly or quite vertically beneath the said ends of the ties, there is no warping strain upon the pedestal timbers, and the truck may be made the full length of a six-wheel truck, so as to give a long and steady bearing upon the track without rendering it weak, owing to the distance between the wheels and the central point, upon which the body of the car is supported.

The common short four-wheel truck is unsteady, owing to the short bearing upon the track, and when the length of the truck is increased, so as to lessen this difficulty, the trucks are rendered weak owing to the distance between the wheels, as stated, the bolster being supported on the center of the truck.

With my truck, as before described, the bearings

marked p. 234  
di. gram  
Here follow

of the car-body on the frame of the truck are placed near to the wheels and directly upon the tie-bar over the equalizer springs, so that there is no injurious strain.

Considerable difficulty attends the use of six-wheeled trucks, especially on uneven tracks, or those having short curves, because the wheels must necessarily be in a straight line, and on short curves the axles have hard side pressure against the boxes, and the flange of the wheels against the rails, causing considerable wear of the journals and boxes, and also the wheels and rails, as well as straining the truck.

The six-wheel truck is also strained by the unevenness of the track, as it is supported in turn on each pair of wheels, and thus the steadiness gained by an extended bearing on the track is lost by the addition of the third pair of wheels.

### Claims.

I claim as my invention—

A swing-motion car-truck, having transverse springs Q R, applied to the intermediate cross-ties D D', and connected at their ends by shackles o q p r, and longitudinal springs or bars O P to the bolster N, as herein represented and described, for the purposes set forth.

In testimony of which invention I have hereunto set my hand.

CHAUNCEY S. BUCK.

Witnesses:

SAML. KNIGHT,  
GEORGE ELLIOT.



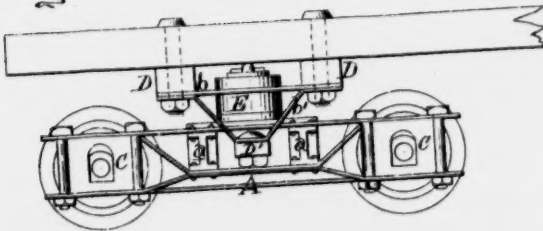
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V. D. BEACH.  
RAILWAY CAR-TRUCK.

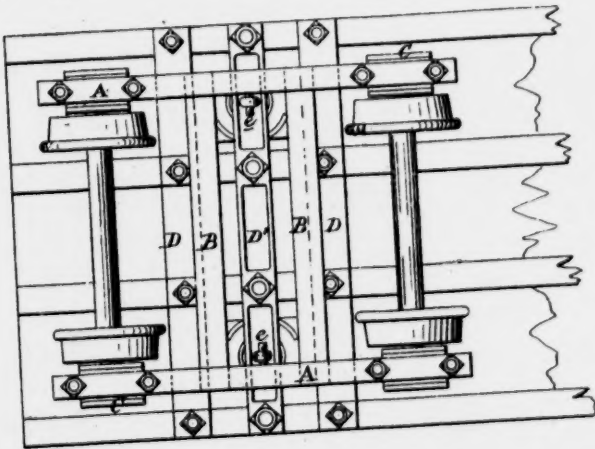
Patented Feb. 8, 1876.

No. 173,257.

*Fig. 1*



*Fig. 2*



Attest:  
*Edward Parshel*  
*H. F. Eberts.*

Inventor:  
*V. D. Beach.*  
per Attorney  
*Wm. H. Maguire.*



V. D. BEACH.  
RAILWAY CAR-TRUCK.

Patented Feb. 8, 1876.

No. 173,257.

Fig. 3.

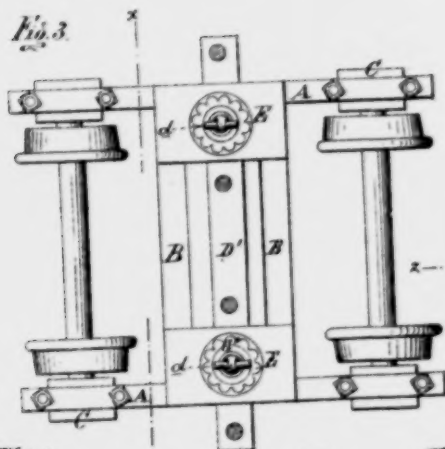


Fig. 6.

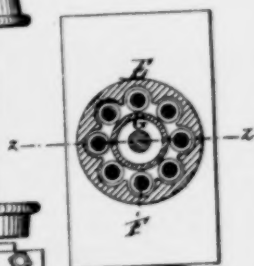


Fig. 4.

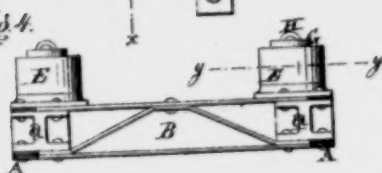


Fig. 7.

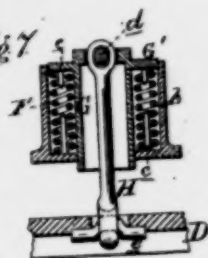


Fig. 5.

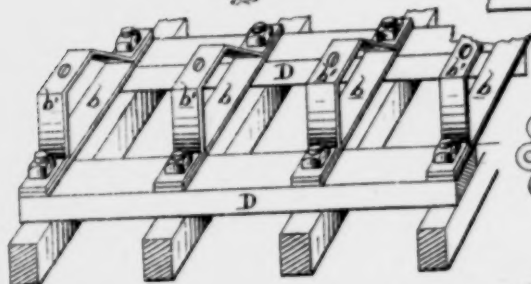


Fig. 8.



Attest:  
Edward Barthel.  
H. F. Cheek.

Inventor:  
V. D. Beach  
per attorney,  
Messrs. Sprague



# UNITED STATES PATENT OFFICE.

VERTOT D. BEACH, OF BATTLE CREEK, MICH., ASSIGNOR OF TWO-THIRDS  
HIS RIGHT TO THOMAS HART AND CHOLETT C. BEACH, OF SAME PLACE.

## IMPROVEMENT IN RAILWAY-CAR TRUCKS.

Specification forming part of Letters Patent No. 173,957, dated February 8, 1876; application filed  
January 31, 1876.

To all whom it may concern:

Be it known that I, VERTOT D. BEACH, of Battle Creek, in the county of Calhoun and State of Michigan, have invented an Improvement in Railway-Car Trucks, of which the following is a specification:

The object I have in view is the construction of a car-truck in such a manner as to dispense with the center bearing and king-bolt heretofore used for swiveling the truck under the car.

The invention consists, first, in the peculiar construction of the truck-frame proper; secondly, in the peculiar construction of the springs in such a manner that their hangers are free to vibrate or oscillate in any direction; and, thirdly, in a peculiar trussed transom or bolster under the car, and in the manner or method of hanging the car to the springs, as more fully hereinafter set forth.

Figure 1, Sheet 1, is a side elevation of the truck. Fig. 2 is a bottom plan of the same. Fig. 3, Sheet 2, is a plan of the truck proper, showing also the lower member of the trussed transom under the car. Fig. 4 is a sectional elevation, showing the portion of the truck-frame that is at the right of the line *x x* in the last figure. Fig. 5 is a bottom perspective view of the car, showing the trussed transom bolted thereto, with the exception of the lower member of said transom. Fig. 6 is an enlarged horizontal section through the spring-case at *y y* in Fig. 4. Fig. 7 is a vertical section of the same at *z z* in the last figure. Fig. 8 is a plan of the spring-trunk.

In the drawing, A A represent the trussed sides of the truck, connected together by two parallel transverse trussed girts, B B, these trusses being all constructed of flat bar-iron, as seen in Figs. 1 and 4. A ribbed post, *a*, is inserted between the open ends of the girders B, and between the upper and lower members of the trusses A, all of which are riveted to the flanges of the posts. C are the axle-boxes secured between the open ends of the side trusses in the usual manner. In lieu of the single transom or bolster under the car I bolt across the car-bottom two parallel transoms, D D, preferably of wood, and across these at regular intervals about four flat iron tie-bars,

*b*, and an equal number of V-braces, *b'*. D' is an iron or steel transom bolted to the bottoms of the V-braces, first, however, being passed through the open space between the upper and lower members of the side trusses, on top of each of which is seated a cylindrical spring-case, E, having a circular opening in its base-plate, around which is arranged a circular row of spiral springs, F, Fig. 7. On top of these springs is seated the flange G' of a cylindrical trunk, G, open at the lower end, which plays down through the opening in the base-plate of the case. Pins *c c* in the flange and base-plate project into the ends of each spiral spring to keep it in position. The flange of the trunk and the upper end of the case are corrugated, as shown, to prevent the former from turning around, while its vertical play is not interfered with. H is a link or hanger having an eye at each end. Through the eye at the upper end passes a pin, *d*, which rests in a groove across the raised top of the trunk. The lower end of the hanger passes through a slot in the transom D', and a cranked pin, *e*, is passed through its eye, as seen in Fig. 7, whereby the car-body is suspended by said hangers from the top of the spring-case trunk.

The advantages of this method of hanging the car are, first, the truck is free to sway laterally, and to accommodate itself to inequalities in the track, without communicating such motions to the body of the car, or at most to a very small extent, doing away with the concussive gage-motion experienced where the car-body is rigidly swiveled to the truck by a king-bolt and center-bearing; secondly, the single transom being replaced by a trussed structure the latter is not liable to fracture, as frequently occurs where a single transom is employed; thirdly, the bed of the car, being supported at two points over each truck, is not so liable to break as when supported by a single transom.

I do not wish to be confined to the particular form of truck-spring shown, as it is evident that any other style of spring may be used which will permit the hangers to oscillate from or on their top connections.

It is evident also that my construction and improvement above described are applicable as

Here follow diagram marked p. 288

well to locomotives and tender-trucks as to those for railroad-cars.

What I claim as my invention is—

1. A railroad-car body, suspended centrally in the truck by hangers or links, which in turn are suspended from springs, in order to permit a free movement of the trucks independently of the car-body, and dispense with a king-bolt, substantially as described.

2. The side trusses A A, connected by the transverse trussed girts B B and ribbed posts a, constructed and combined to form a rigid truck-frame, substantially as described.

3. The trussed transom D D' b b', secured to the car-bed, substantially as described, and suspended by the hangers H H from springs mounted upon the truck-frame, substantially as shown and set forth.

4. The herein-described car-spring, consisting of the case E inclosing a row of spiral springs, F, surmounted by the flanged trunk G G', substantially as described.

VERTOT D. BEACH.

Witnesses:

H. F. EBERTS,

CHARLES J. HUNT.

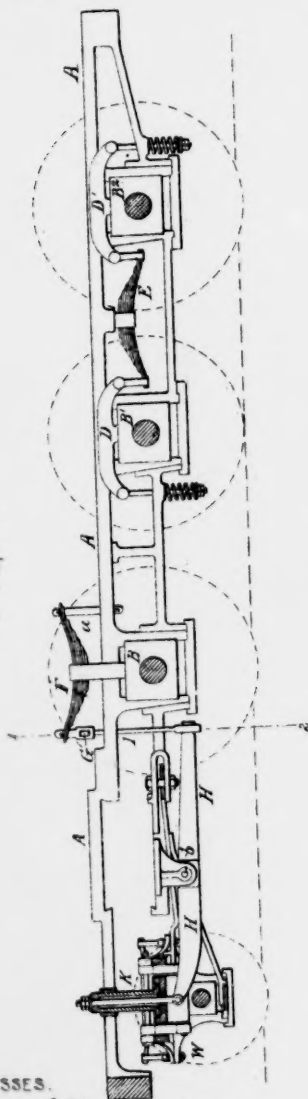
(No Model.)

E. LONGSTRETH.  
LOCOMOTIVE ENGINE.

No. 249,962.

Patented Nov. 22, 1881.

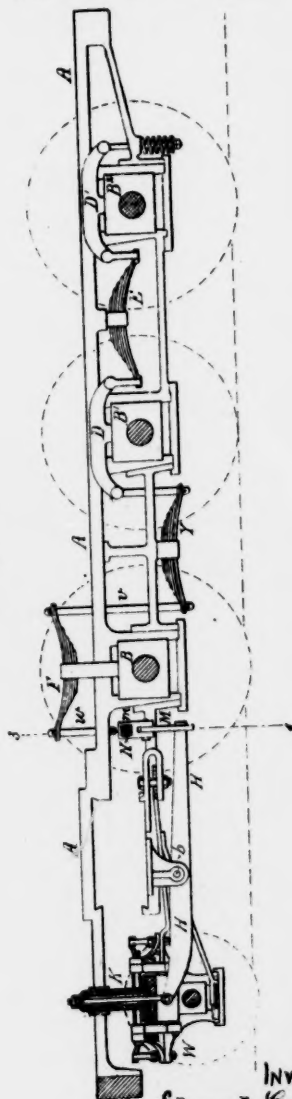
FIG. 1.



WITNESSES.

David S Williams  
Harry Smith

FIG. 3.



INVENTOR

Edward Longstreth  
by his attorneys  
Hewson and Son





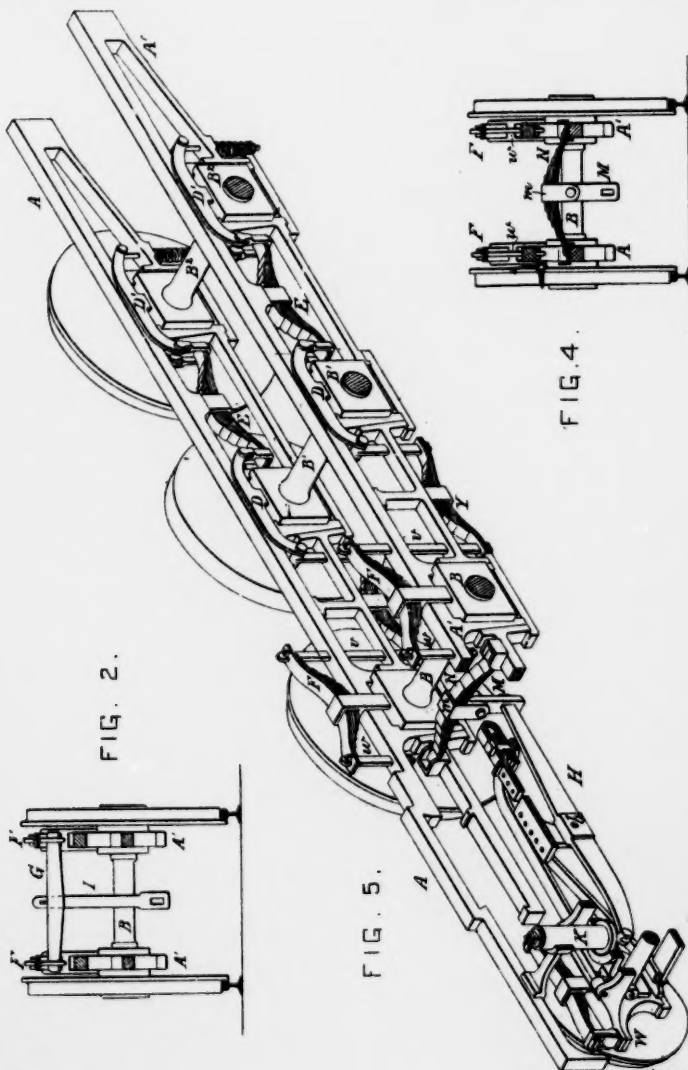
(No Model.)

2 Sheets—Sheet 2.

E. LONGSTRETH.  
LOCOMOTIVE ENGINE.

No. 249,962.

Patented Nov. 22, 1881.



WITNESSES:

David S. Williams  
Harry Smith

INVENTOR

Edward Longstreth  
by his Attorneys  
Housman and Jones



## UNITED STATES PATENT OFFICE.

EDWARD LONGSTRETH, OF PHILADELPHIA, PENNSYLVANIA.

## LOCOMOTIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 240,962, dated November 22, 1881.

Application filed October 10, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD LONGSTRETH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain  
 5 Improvements in Locomotive-Engines, of which the following is a specification.

My invention relates to that class of locomotive-engines in which a truck is combined with one, two, or more driving-axes and one or more pairs of driving-wheels, and in which  
 10 an equalizing lever extending from the truck is connected at the rear end to a spring or springs, the object of my improvements, which are fully described hereinafter, being to prevent the rolling or careening of locomotives  
 15 of this class, which are well known among railroad engineers as "mogul" or "consolidation" engines.

In the accompanying drawings, Figure 1,  
 20 Sheet 1, is a vertical section of sufficient of a locomotive engine to illustrate the ordinary mode of construction adopted prior to my invention by the Baldwin Locomotive Works; Fig. 2, Sheet 2, a transverse section on the line  
 25 1-2; Fig. 3, Sheet 1, a vertical section, illustrating my invention; Fig. 4, Sheet 2, a vertical section on the line 3-4; Fig. 5; and Fig. 5, Sheet 2, a perspective view in which part of one of the main frames is cut away.

30 My improvements may be more readily understood by referring, in the first instance, to the mode of construction practical prior to my invention and illustrated in Figs. 1 and 2.

There are the usual frames, A A', and three  
 35 driving-axes, B, B', and B'', for three pairs of coupled driving-wheels. The box for the second driving-axis, B', in each frame bears against the under side of the equalizing-lever D, and the box of the third axle, B'', against  
 40 the under side of the equalizing-lever D', these levers being combined with a system of springs too well known and too clearly shown in the drawings to need description. This arrangement of equalizing-levers and spring is the  
 45 same on both sides of the engine. Each box of the first driving-axis bears against a spring, F, which is connected at one end to the frame by a strap or link, a, and at the other end to a transverse bar, G, Fig. 2. In like manner  
 50 the corresponding spring F at the opposite side of the engine is connected at one end to the frame, and at the other end to the same transverse bar G, and this is connected in the middle by a link, I, to one arm of the lever H, the  
 55 other arm of which is jointed to the lower end of

a rod which passes through the king-post K of the truck W. This truck, which is of well-known construction, is provided with springs for the axle-boxes, as usual, and these springs serve to partially absorb the shocks to which  
 60 the truck is subjected; but the main shocks are transmitted through the lever H to the springs F F. Locomotives in which the lever H is connected to the springs F F of the boxes of the first driving axle are apt to careen or  
 65 roll when running at high speed, and for this reason I have adopted the plan which I will proceed to describe, reference being had to Figs. 3, 4, and 5.

The lever H is connected to the lower end of a link, M, Figs. 4 and 5, which is joined to  
 70 the strap m of a transverse spring, N, the ends of the latter having their bearings on the opposite frames A A'.

The springs F F have no connection whatever with the lever H, each of these springs  
 75 being connected at one end by a link, n, to the frame, and at the opposite end by a link, v, to one end of a spring, Y, which bears against the frame, and the opposite end of  
 80 which is connected to one of the arms of the equalizing-lever D. It will thus be seen that the springs F F of the boxes of the first driving-axle are totally independent of the spring for the truck, the lever H having its own spe-  
 85 cial spring, N, bearing on the frame.

It has been ascertained by practical comparison of locomotives built according to my improvement with those built according to the plan first described and illustrated in Figs. 1  
 90 and 2, that the objectionable careening or rolling of the locomotive made in accordance with the old plan is obviated by my invention.

I claim as my invention—

1. The combination of the lever H of a lo-  
 95 comotive with a spring, N, having its bearing on the frames and independent of the springs of the driving-axle, substantially as set forth.

2. The combination of the lever H of a locomotive with a spring, N, having its bearing on  
 100 the frames, and the link M, jointed to the strap m of the said spring, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD LONGSTRETH.

Witnesses:

EDWARD H. WILLIAMS,  
HARRY SMITH.

diagrams marked p. 201 & 232.



(No Model.)

2 Sheets—Sheet 1.

C. N. HASKINS.  
VEHICLE SPRING.

No. 330,023.

Patented Nov. 10, 1885.

Fig. 1.



Fig. 2.



Fig. 3.

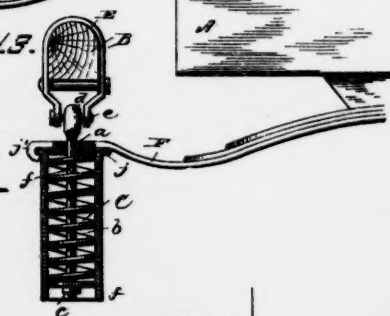


Fig. 4.



Fig. 5.

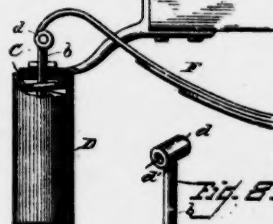


Fig. 7.



Fig. 6.



Fig. 8.



Witnesses.  
Wm. J. Guiden.  
Albie A. Foot

Inventor.  
Charles N. Haskins,  
by Franklin H. Hough,  
Attorney.



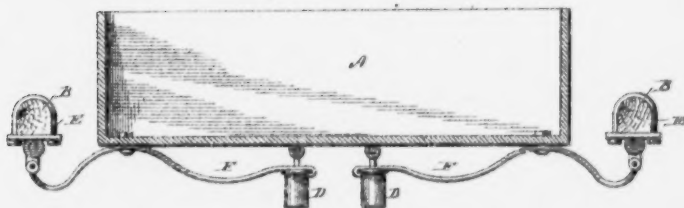
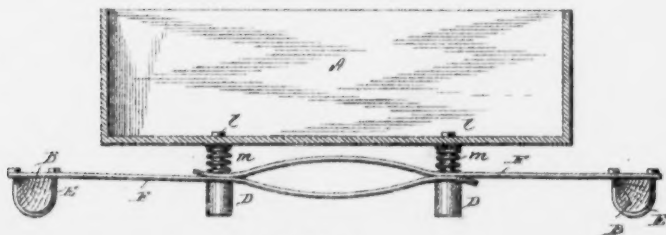
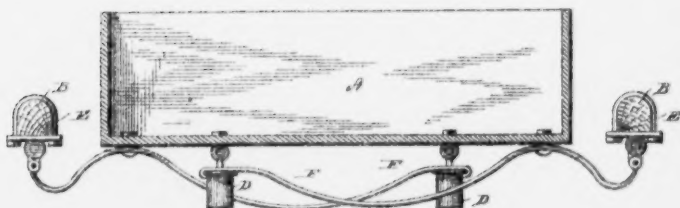
(No Model.)

2 Sheets--Sheet 2.

C. N. HASKINS.  
VEHICLE SPRING.

No. 330,023.

Patented Nov. 10, 1885.

Fig. 5.Fig. 10.Fig. 11.

Witnesses  
J. H. H. H. H.  
H. H. H. H.

Inventor.  
Charles N. Haskins,  
by Franklin H. H. H.,  
Attorney.





## UNITED STATES PATENT OFFICE.

CHARLES NELSON HASKINS, OF COLUMBUS, OHIO.

## VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 330,023, dated November 30, 1885.

Application filed March 5, 1885. Serial No. 137,740. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES N. HASKINS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Springs for Wagons, Carriages, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and letters of reference marked thereon, which form a part of this specification.

Like letters refer to similar parts throughout the several views.

The object of my invention is to provide a novel and efficient spiral spring adapted to be used either separately or in combination with any of the various forms of leaf-springs now in use upon wagons and other vehicles.

It is my further object to provide a spring which will be both simple in construction and inexpensive, and which, when used either separately or in combination with other springs, may be readily adjusted to the various loads to be carried, will permit the body of the vehicle to which they are attached to be placed lower than is possible with the use of springs heretofore constructed. The springs may be easily replaced or repaired, and when used upon carts or other two-wheeled vehicles will in a great measure overcome the "horse motion" or "jolt" caused by the movements of the horse.

I accomplish these objects in the manner hereinafter specified.

Referring to the drawings, Figure 1 is an end elevation of a portion of a vehicle-body with my improved spiral spring suspended from the side bar by means of a clip, and having the outer end of a leaf-spring attached to the lower extremity of the case containing the spiral spring. A portion of the case is removed to show the construction and arrangement of the parts. Fig. 2 is a similar view of a portion of a vehicle-body in which the spiral spring is shown as used independently of other springs, and is attached to the platform of the vehicle by means of a body-loop. Fig. 3 is a similar view, partly in section, in which

the spiral spring is shown in combination with a leaf-spring, the outer end of the leaf-spring being shown as resting upon the upper end of the case containing the spiral spring. Fig. 4 is a similar view in which the spiral spring is shown as used in combination with a body-loop, the outer end of which is shown as resting upon the upper end of the spiral-spring case. Fig. 5 is a similar view, partly in section, in which the spiral spring is shown as used independently of a side bar, the spring being attached to the platform of the vehicle by means of a body-loop, and the leaf-spring having its outer end attached to the upper end of the spiral-spring actuating-rod. Fig. 6 is a modification. Fig. 7 and 8 are details. Figs. 9 and 10 are end elevations of a vehicle-body in which the spiral spring is shown as used in combination with a leaf-spring, the spiral spring being secured to the lower surface of the platform, and the inner ends of the leaf-spring resting upon the upper ends of the spiral-spring cases, and the outer ends of the springs being shown as attached to the side bars of the vehicle by means of clips. Fig. 11 is a modification.

A represents a portion of the body of a vehicle; B, the side bar to which the spiral spring C is pivotally attached by means of clips, as shown in Figs. 1, 2, 4, &c., of the drawings. The spiral spring C is inclosed within a cylindrical metallic case closed at its upper end, with the exception of a small opening, *a*, in the center. The spring actuating rod *b* is passed through the opening *a*, and, extending downward through the center of the case, terminates at a point in the plane of the lower extremity of the same. The lower end of the rod *b* is threaded to accommodate a nut *e*, while its upper end, which is extended above the upper end of the cylinder or case, is provided with a head, *d*, which may be cylindrical, as shown in Fig. 8. The head *d* is provided with a hole, *d'*, through which the bolt *e* is passed in securing the same to the clip B. The spring C is placed within the case from its lower end, the rod *b* is inserted, and the washer *f* is placed upon the lower end of the rod and secured by means of the nut *e*.

When it is desired to attach the spring as shown in Figs. 1 and 2 of the drawings, the

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case is so constructed that two opposite sides of the same are extended downward so as to form the ears *g*. The spring may be attached either to the body-loop or leaf-spring by means of the bolt *g*, passed through suitable holes provided in the ears *g*.

When the spiral spring is intended to be used in either of the combinations shown in Figs. 3, 4, and 5 of the drawings, the ears *g g* are omitted from the lower extremity of the case, and similar ears or projections, *h h*, are formed upon the upper extremity of the case, which, when bent downward, as shown in Fig. 7, serve to secure in place the end of the spring or body-loop, which is between the ears and the upper extremity of the case.

In Fig. 3 the leaf spring *F* is secured in place upon the upper end of the case. When to be used in this form, the top of the case is so constructed as to extend beyond the sides of the case forming the rim *j*, and the end of the leaf-spring or body-loop is bent downward, as shown at *j'*, Fig. 3, so as to bear against the lower edge of the rim.

Fig. 11 is a modification. When intended to be used in this form, the spring-actuating rod heretofore described is omitted, and its place supplied by a bolt, *l*, which is extended a sufficient distance above the top of the case to pass through the leaf-spring bar or rod and permit the separate spiral spring *m* to be inserted between the leaf-spring bar or rod and the platform of the vehicle. The rod *l* is extended through the platform and secured by means of a nut upon the upper surface of the platform.

In the modification shown in Fig. 6 of the drawings the metallic case and spring-actuating rod are omitted, and the spiral spring is suspended from the side bar and attached to the leaf-spring by means of bolts passed through loops formed by bending the ends of the wire or rod of which the spring is composed.

I am aware of the Patent No. 203,863, of 1878, which shows a metal case inclosing a rubber spring said case having formed integral therewith a clip or clamp adapted to embrace and to be rigidly secured to the side bar, the end of the cross-spring being pivotally connected to a rod extending upward through said rubber spring; but the spring there shown is not a pendent one, and is not

pivotally connected to but is rigid with the side bar. I am also aware of the Patent No. 3,126, of 1843, and make no claim to the construction shown therein as forming part of my invention.

I deem it important that my spring be interposed between the ends of the leaf-spring and the side bars and pivotally connected thereto. I also attach importance to my peculiar arrangement of parts.

On reference to Fig. 1 it will be seen that the case inclosing the spring is open at the bottom to facilitate the ready adjustment of the spring *C* to adapt it to the load to be carried, which adjustment is accomplished by turning the nut *c* in one direction or the other, as will be readily understood.

Having thus described my suspended spiral spring, and pointed out some of the forms in which it may be used, both as an independent spring, and also in combination with leaf and other vehicle springs, what I claim to be new, and desire to secure by Letters Patent, is—

1. The combination, with a side bar and leaf-spring of a vehicle, of an incased spiral spring pivotally connected at one end to the leaf-spring, and a clip pivoted at one end to the opposite end of said spiral spring, and its other end embracing the side bar, substantially as and for the purpose specified.

2. A cylindrical case having an open end and an aperture through its closed end, as shown, the rod *b*, inserted through said aperture and having an enlarged head and threaded lower end, the spiral spring *C*, encircling said rod within the case, the washer *f*, supporting said spring, and the adjusting-nut *c*, all combined, arranged, and operating as set forth.

3. A cylindrical case having an open end and an aperture through its closed end, the rod *b*, inserted through said aperture and having an enlarged head and threaded lower end, the spiral spring *C*, encircling said rod within said case, and adjusting means, as described, within said case, in combination with a clip pivotally connected with said enlarged head, as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES NELSON HASKINS.

Witnesses:

J. R. BOWDLE,  
A. T. STEVENS.

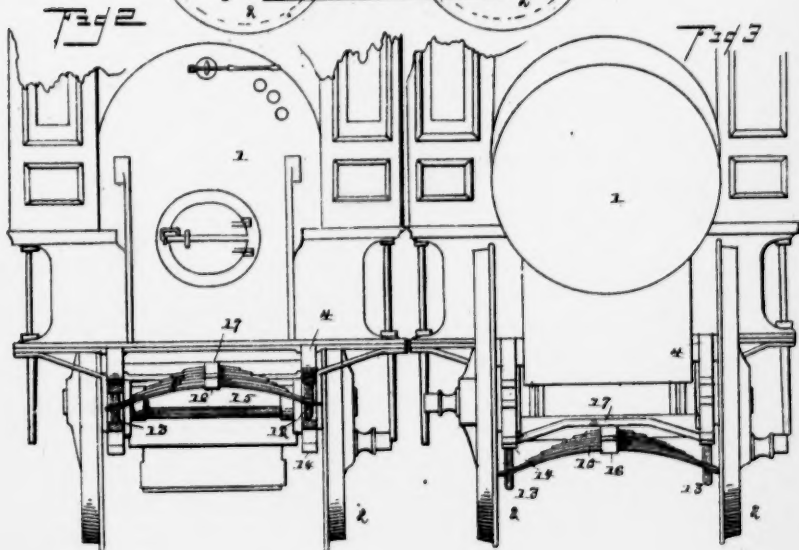
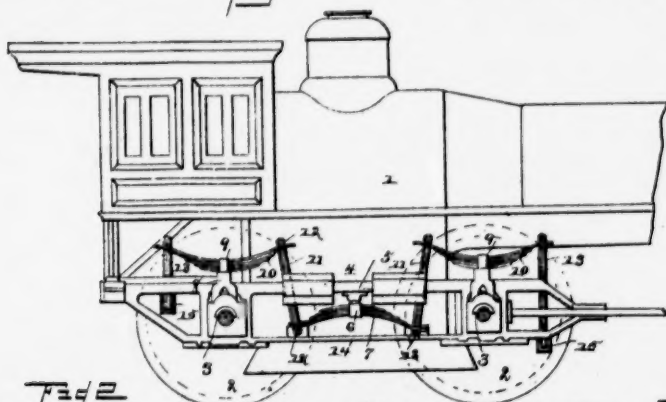
(No Model.)

J. T. HEFFERNAN.

SPRING GEAR FOR LOCOMOTIVES.

No. 412,256.

Patented Oct. 8, 1889.



Witnesses:

John Amie  
W. Small

Inventor

John T. Heffernan

By his Attorneys,

C. A. Snow &amp; Co.



# UNITED STATES PATENT OFFICE.

JOHN T. HEFFERNAN, OF DUNKIRK, NEW YORK.

## SPRING-GEAR FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 412,356, dated October 8, 1889.

Application filed June 27, 1889. Serial No. 315,741. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HEFFERNAN, a citizen of the United States, residing at Dunkirk, in the county of Chautauqua and State of New York, have invented a new and useful Spring-Gear for Locomotives, of which the following is a specification.

This invention has relation to a spring-gear especially adapted for locomotives, and among the objects in view are to wholly suspend the locomotive proper upon a yielding spring-gear so arranged as to relieve the machinery of the excessive strain, thereby increasing the life and efficiency of the locomotive, said yielding motion being in a vertical line and obviating, so far as possible, the usual undesirable swaying of the cab and consequent stress upon the many parts.

The invention consists in certain features of construction hereinafter specified and more particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of a portion of a locomotive suspended in accordance with my invention. Fig. 2 is a rear view. Fig. 3 is a front view.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 represents a locomotive boiler, 2 the wheels, 3 the journals thereof, and 4 the usual connecting-frame, the elements specified constituting the trucks.

From the usual longitudinal side bar 5, composing the frame-work of the truck, and intermediate the two wheels 2, there projects downwardly a yoke 6, in the lower end of which I mount a semi-elliptical bow-spring 7. From each of the journals 3 there projects upwardly standard 8, having yokes 9 at their upper ends, in each of which I mount an upwardly-disposed semi-elliptical bow-spring 10, of a type similar to the spring 7, but inverted when considered in relation to the spring 7. The ends of the spring 7 and the inner ends of the two springs 10 slightly pass each other, and are connected by loose suspension-links 11, depending from the inner ends of the springs 10 and taking under the ends of the spring 7. The connection may be formed in any suitable manner, so that the same be pivotal, and to accomplish this purpose I herein simply employ cross-pins 12, which

take under and over the ends of their respective lower and upper springs. At the outer ends of the springs 10 are provided similar suspension-links 13, the lower ends of which embrace the lower longitudinal bar 14 of the frame or truck 4, and interposed between the ends of the links 13 and the bar 14, at outer ends of the truck, is a transverse semi-elliptical spring 15, the center of which is connected by a yoke 16 to the transverse bar 17, formed in the truck-frame.

The mechanism described is duplicated at each side of each truck.

I have herein shown my invention as applied to locomotives, and have also described the springs as being connected to certain character of frames or trucks; but I would herein state that I do not limit my invention either to a locomotive or to suspending the same from the bars described, as other forms of trucks requiring minor changes in this regard may be used in connection with my invention.

Having described my invention, what I claim is—

1. A spring-gear comprising a continuous series of alternately disposed and arranged semi-elliptical bow-springs connected by pivotal couplings, substantially as specified.

2. A spring-gear consisting of a continuous series of alternately arranged semi-elliptical bow-springs, each alternate spring being arranged out of a plane with the adjacent springs, and pivotal links connecting said springs, substantially as specified.

3. The combination, with a locomotive and its trucks, of standards mounted upon the journals of the trucks and projecting upwardly and provided with yokes, semi-elliptical bow-springs mounted in the yokes, a similar spring mounted intermediate the standards and disposed in an opposite direction, and links pivotally connecting the end of the springs, substantially as specified.

4. The trucks 4, having the bars 5, 14, and 17, in combination with the journals 3, having the yokes 8 and 6, the former having the standards 8, the springs 10, mounted in the yokes 9, and the spring 7, mounted in the yoke 6, depending from the bar 5, the links 11, having the pins 12, connecting the outer ends of

marked p. 268  
diagram  
Here follow

the springs 7 with the inner ends of the springs 10, and the links 13, connecting the outer ends of the springs 10 with the end springs 15, mounted in the yoke 16, depending from the bar 17, said spring 15 connecting the series at one side to the series at the opposite side, substantially as specified.

5 5. A continuous spring-gear consisting of a continuous series of oppositely - disposed 10 springs arranged along the sides and ends of the truck of a locomotive or the like, all the springs being connected together by pivotal couplings, as set forth.

6. A continuous spring-gear for locomotives 15 or the like, consisting of a series of springs

connected together by pivotal couplings, as set forth.

7. A continuous spring-gear consisting of a series of oppositely-disposed springs arranged in different horizontal and vertical planes, the 20 ends of one spring being coupled to the ends of the adjacent spring, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN T. HEFFERNAN.

Witnesses:

T. W. MCCARTHY,  
JOHN RYAN.

(No Model.)

2 Sheets—Sheet 1.

S. J. BLOCK.  
RUNNING GEAR.

No. 416,555.

Patented Dec. 3, 1889.

Fig 1



Fig 2.

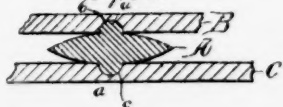


Fig 3.

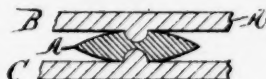


Fig 4.



Fig 5

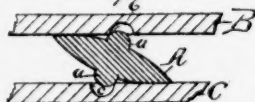


Fig 6.

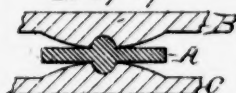


Fig 6.

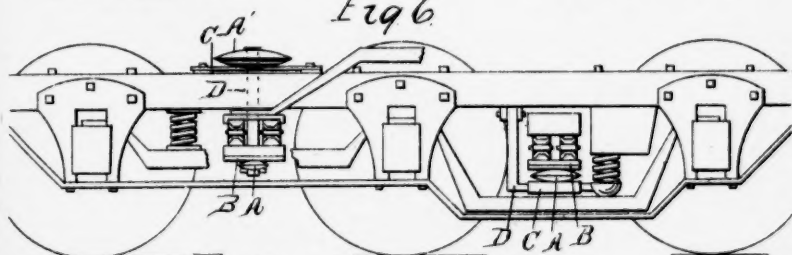


Fig 7.

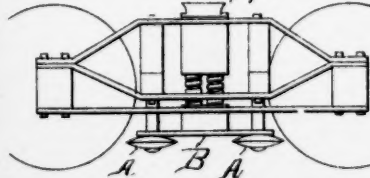


Fig 8.

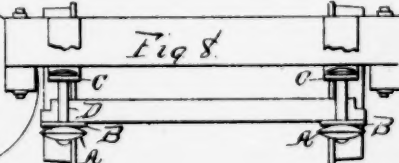


Fig 10



Fig 9

Inventor

Samuel J. Block

By His Attys  
Hill & Dixon.





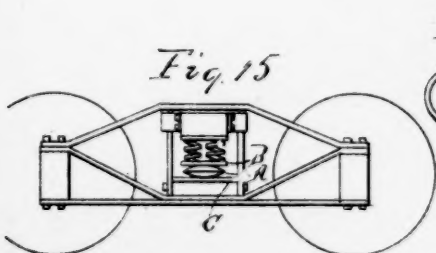
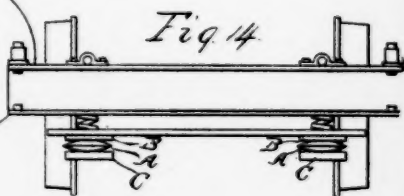
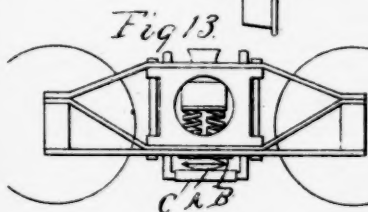
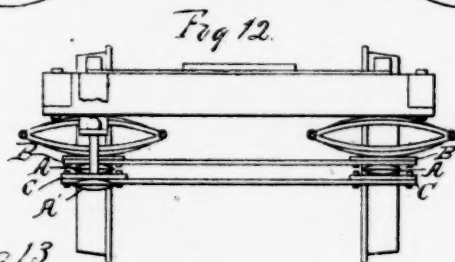
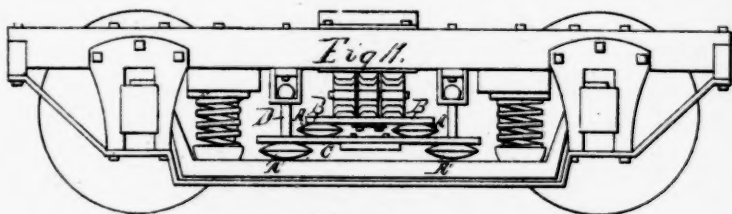
(No Model.)

2 Sheets—Sheet 2.

S. J. BLOCK.  
RUNNING GEAR.

No. 416,555.

Patented Dec. 3, 1889.



Witnesses  
Harry Bitner  
A. Sherburne

Inventor.  
Samuel J. Block  
By his Atty.  
Hill & Dixon.



# UNITED STATES PATENT OFFICE.

SAMUEL J. BLOCK, OF CHICAGO, ILLINOIS.

## RUNNING-GEAR.

SPECIFICATION forming part of Letters Patent No. 416,555, dated December 3, 1889.

Application filed December 26, 1888. Serial No. 294,725. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL J. BLOCK, a citizen of the United States of America, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Running-Gear for Car-Trucks and other Vehicles, of which the following is a description.

My invention relates to all classes of vehicles which are subject to longitudinal and lateral shocks, and which are designed for such uses as to render it desirable to ease up these shocks as much as possible. Such vehicles are generally provided with some form of spring to take up vertical jars or jolts; and the object of my invention is to devise a simple means to convert all horizontal movement of the body of the vehicle upon the running-gear into a vertical movement thereon, in order that both the weight of the body with its load and also the vertical spring may be made to offer a yielding resistance to these horizontal movements. I understand that others have heretofore attempted by means of various devices to accomplish the same result, and my invention is in the nature of an improvement upon such devices; and it consists in the interposition between the car or other vehicle and the wheels which carry it a simple little device, hereinafter described, which I shall call a "rocker," and in the application and combination of said device to and with the various parts of the running-gears of different vehicles, all of which are specifically enumerated in the claims appended hereto.

It will be seen from the drawings that this device consists of a form of rocker resembling somewhat a flattened sphere, upon which the weight of the car rests, and which in turn rests either directly or indirectly upon the axle of the wheels.

Figure 1 is a face view of this rocker, lettered A, and Figs. 2, 3, and 4 show vertical sections of different forms of the same. In the figures the rocker will be seen to present two convex surfaces, upon the upper of which the beam B, which supports the body of the car, rests, while the lower surface of the rocker rests upon the beam C, supported upon the axle. To prevent slipping at these

bearings the rocker is provided with projecting lugs or pins *a*, Fig. 2, resting in the recesses *b c*, formed to receive them in the beams B C, respectively. It is obvious that this arrangement may be reversed and the lugs be placed upon the beam and the recesses in the rocker, as shown in Fig. 3, or both may contain recesses and separate pins or balls be fitted into the cavity formed by the two, as in Fig. 4. It is also plain that the convex surfaces may be placed upon the beams as well as upon the rocker, as represented in Fig. 17.

As all horizontal sections of the rocker A in the preferable form here shown are circular, all vertical diametrical sections will be alike, so that we may consider the section shown in Fig. 2 as any diametrical vertical section of the rocker shown in Fig. 1; and hence if we examine the operation of this rocker with reference to a movement of the beam B in the plane of this section we shall learn its operation with reference to a movement in any direction. It will be readily seen that a movement of the beam B toward the left, the beam C being relatively stationary, will tilt the rocker into the position shown in Fig. 5, separating the beams B and C and thereby converting this horizontal movement into a vertical one. The ratio of this vertical movement to the horizontal one can be varied as may be desired by varying the form of the rocker. As the rocker approaches more nearly to the form of a sphere the vertical movement diminishes until when the rocker becomes a sphere it disappears altogether. On the other hand, as the rocker approximates a flat disk the vertical movement increases until it becomes so great that the rocker is practically rigid. The length and shape of the pins *a* must of course be governed by the amount of play that it is desired to give the rocker, their function being merely to keep the rocker in place and prevent the beams B and C from slipping thereon.

In the remaining figures of the drawings I have shown how this rocker may be applied to various forms of car-trucks and carriages.

Fig. 6 represents a six-wheel passenger-truck with certain portions broken away, and shows two ways in which my device may be applied thereto. Figs. 11 and 12 are side and

diagrams marked p. 27/ 272  
 x/ Here follow

end views, respectively, of a four-wheel passenger-truck containing the same device. Figs. 7, 13, and 15 are side views of freight-trucks embodying my invention. Figs. 8 and 14 are end views of the trucks shown in Figs. 7 and 13, and Figs. 9, 10, and 16 illustrate the application of the rocker to a carriage.

In Fig. 6, at the left hand, the rocker A is placed between the beam B, which supports the car, and the plank C, resting upon the hanger D. At the right hand of the same figure the rocker is applied to the hanger D itself, and an additional rocker A' employed at the other end of the hanger. In Figs. 11 and 12 these two forms are combined, the bar C being extended to rest upon the rockers A', attached to the universal hangers D.

Convenient ways of applying this rocker to freight-trucks are clearly illustrated in Figs. 7, 8, 13, 14, and 15.

In carriages and other light vehicles the rocker may be interposed between the different portions of the springs, as in Figs. 9, 10, and 16, the ends of the same being broadened, as shown in Fig. 10, to furnish a bearing for the rocker in the case of a longitudinal shock.

I claim as new and desire to secure by Letters Patent—

1. The combination of the body of the vehicle and the support upon which it rides with a rocker A, interposed between the two, so shaped that a movement of the one with regard to the other in any direction will cause

them to separate, as and for the purpose stated.

2. The combination of the body of a vehicle and the support upon which it rides with a double convex rocker interposed between the two, provided with means to prevent its slipping upon either, as and for the purpose stated.

3. The combination of the body of a vehicle and the support upon which it rides with a rocker A, provided with pins a, fitting into corresponding recesses in the surfaces upon which the rocker bears, as and for the purpose set forth.

4. In a vehicle, a hanger D, provided at one end with a rocker so shaped that the swinging of the hanger in any direction will raise the load carried thereby, as and for the purpose stated.

5. In a vehicle, the hanger D, provided at each end with a rocker so shaped that the swinging of the hanger out of a vertical line will raise the load upon the rocker, as and for the purpose stated.

6. In a car-truck, the beam B, which supports the car, resting upon the rocker A, which itself rests upon the bar C, carried upon the rockers A', attached to the hangers D, substantially as shown and described.

SAMUEL J. BLOCK.

In presence of—

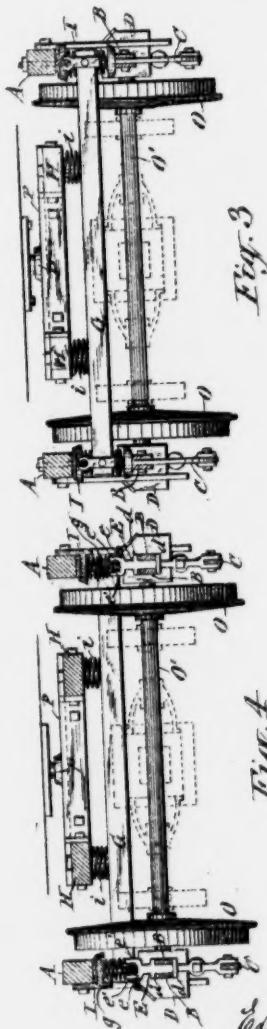
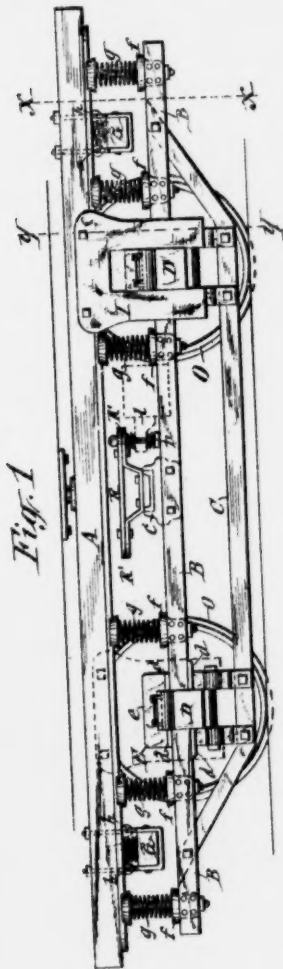
HARRY BITNER,  
ROBT. RYAN.

(No Model.)

E. PECKHAM.  
CAR TRUCK.

No. 424,723.

Patented Apr. 1, 1890.



WITNESSES:

C. L. Burdison  
J. J. Laasy

INVENTOR:

Edgar Peckham  
BY  
Shull, Loomis & Shull  
ATTORNEYS



(No Model.)

3 Sheets—Sheet 2.

E. PECKHAM.  
CAR TRUCK.

No. 424,723.

Patented Apr. 1, 1890.

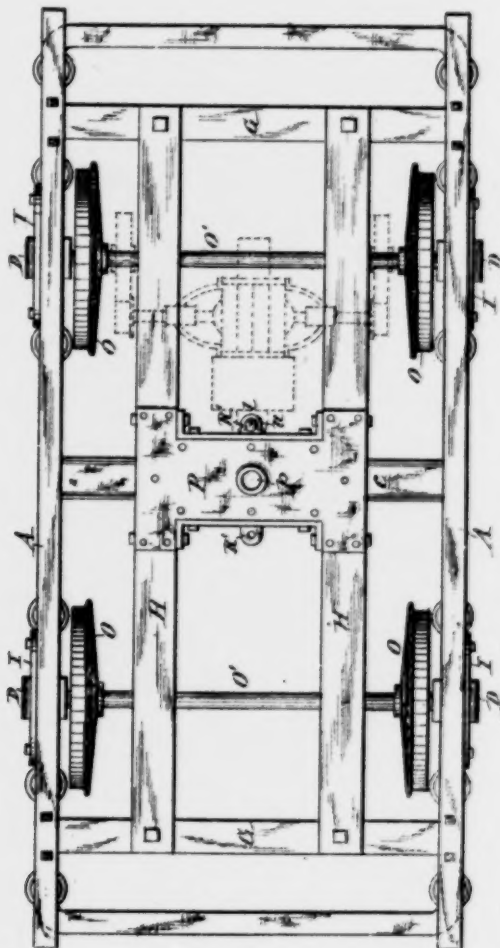


Fig. 2

WITNESSES:

*C. L. Burdison*  
*J. J. Laasy.*

INVENTOR:

*Edgar Peckham*  
 BY  
*Wm. L. Lacey & Son*  
 ATTORNEYS





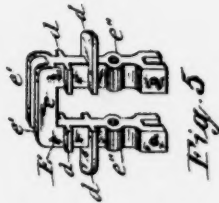
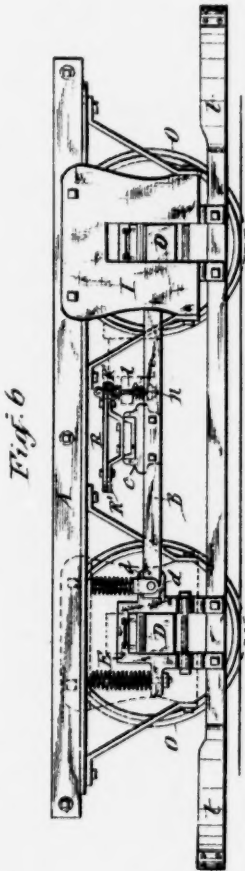
(No Model.)

3 Sheets—Sheet 3.

E. PECKHAM.  
CAR TRUCK.

No. 424,723.

Patented Apr. 1, 1890.



WITNESSES:

C. L. Burdison

J. J. Laass

INVENTOR:

Edgar Peckham

BY

Shull, Laass & Shull  
his ATTORNEYS



## UNITED STATES PATENT OFFICE.

EDGAR PECKHAM, OF NEW YORK, N. Y.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 424,723, dated April 1, 1890.

Application filed December 7, 1889. Serial No. 332,921. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR PECKHAM, of New York, in the county of New York, in the State of New York, have invented new and useful Improvements in Car-Trucks, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates chiefly to the class of trucks employed on electrically-propelled cars; and it consists in an improved construction and combination of parts, as hereinafter described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a side elevation of a car-truck embodying my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical transverse section on line *x x*, Fig. 1. Fig. 4 is a vertical transverse section on line *y y*, Fig. 1. Fig. 5 is a detached perspective view of one of the saddles, and Fig. 6 is a side elevation of a modification of my improved car-truck.

Similar letters of reference indicate corresponding parts.

O O designate the car-wheels, and O' O' the axles thereof.

D D are the journal-boxes. Upon each of the latter is mounted a saddle E, consisting of a horizontal bar *e*, by which it rides on top of the journal-box, and which is braked by vertical flanges *e' e'* along its sides. Arms or jaws *e'' e''* depend from the ends of the bar *e* and are formed integral therewith and embrace the sides of the journal-box. The said arms or jaws are formed with two shoulders *d d* on each of the inner and outer edges, and between said shoulders are fitted tightly edge-wise the ends of longitudinal beam-sections B B, which are dual and riveted or otherwise rigidly secured to the inner and outer sides of the jaws *e'' e''*. Said beams are thus firmly supported and serve to securely tie the saddles to each other.

In order to further support the free ends of the end sections of the longitudinal beams B B, I extend the jaws *e'' e''* of the saddles E E below the journal-boxes, and preferably bifurcate the ends of said jaws, as shown in Fig. 4 of the drawings, and in the bifurcation thereof I secure the horizontal beam of the

truss C by bolts or rivets passing through perforations in the ends of the jaws and in the truss-beam, which latter is placed edgewise vertically. The ends of the truss are extended obliquely upward and enter between the end portions of the dual beams B B and are riveted or bolted thereto.

A A represent the longitudinal top beams, which may be composed either of wood or of metal, or of both. To these beams are attached the pedestals I, the jaws of which embrace the sides of the journal-boxes, and thus prevent the same from moving forward and rearward, and consequently prevent the same movement of the lower beams B B.

To the top of the beams B B are secured suitable steps *ff*, on which are seated the body-supporting springs *g g*, bearing with their upper ends against the under side of the upper beam A, which is thus supported elastically vertically.

When two trucks are to be placed, respectively, under the two end portions of the car-body, I secure to the end portions of the upper beams A cross-beams G G, and preferably allow them a slight movement crosswise of the truck by connecting said beams to the beams A A by means of hinged couplings *h h*. Upon the cross-beams G G, between the beams A A, I mount a horizontal frame extending lengthwise of the truck, and preferably formed of longitudinal bars H H, resting with their ends on rubber or spring cushions *i i*, interposed between said bars and cross-beams G G. To the top of the central portion of the bars H H is securely fastened a metal plate P, which is provided with a socket or step *p* for the reception of the pivot secured to the under side of the car-body.

On a short truck I dispense with the truss C and attach to the lower ends of the jaws *e'' e''* the longitudinal bars, to the ends of which the snow-plow *t* is attached, as shown in Fig. 6 of the drawings, and also dispense with the end extensions of the beams B B.

*c* denotes a longitudinally-channeled cross-bar, which is secured at opposite ends to the lower side beams B B, and is thus carried a uniform distance above the track. In the channel of the said cross-bar I secure lengthwise thereof a wooden bar filling said channel,

diagram marked p. 275 276 & 277  
x Here follow

so as to deaden the sound thereof. Across the center of this cross-bar I secure an upright frame R, which is preferably trapezoidal in form and seated with its shorter side upon the cross-bar c. The top portion of this frame is formed with an extension R' toward the motor, and when two of the latter are to be connected to the truck I form the frame R with two extensions R' R' forward and rearward from the frame. The heel l of the motor is connected to the extension R' by a suitable coupling n, which may consist simply of a bolt suspended from the extension R' and passing through the heel l, and provided underneath the same with a head or nut, and a spring surrounding the bolt between the heel l and frame. Extension R' affords the desired upwardly-yielding support to the motor-heel.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the journal-boxes, the saddles E E, riding upon said journal-boxes and formed with integral pendent jaws embracing the sides of the journal-boxes and extending below the same, longitudinal beams connecting said saddles to each other, and the longitudinal bar C, attached to the lower ends of said jaws, as set forth.

2. In combination with the journal-boxes, the saddles E E, riding upon said journal-boxes and formed with integral pendent jaws embracing the sides of the journal-boxes and extending below the same, the longitudinal beams B B, composed of sections attached to the jaws of the saddles at opposite sides of the journal-boxes, and the truss C, attached to the lower ends of the aforesaid jaws and to the end portions of the beams B B, substantially as described and shown.

3. The combination, with the longitudinal

side beams A A, of hangers connected to the end portions of said beams by hinged couplings, the cross-beams G G, secured to said hangers, longitudinal bars H H, mounted on the cross-beams, and the plate P, secured to the bars H H and provided with a step for the pivot of the car-body, as set forth and shown.

4. In an electric-motor truck, the combination, with the cross-bar c, of the truss R, secured transversely to the said cross-bar and extending toward the motor, and the heel of the motor hung to said extension, as set forth.

5. In an electric-motor truck, the combination, with the cross-bar c, of the trapezoidal metal frame R, secured with the shorter of its parallel sides transversely to the aforesaid cross-bar and formed with the extensions R' R' on its longer side, and a coupling attaching the heel of the motor to one of the extensions R', substantially as described and shown.

6. The combination, with the channeled cross-bar c, of the wooden bar a, secured in the channel of said cross-bar lengthwise thereof, and a motor-support secured to the cross-bar, as set forth.

7. In combination with the journal-boxes D D, saddles E E, longitudinal beams B, connected to said saddles, longitudinal top beam A, and springs interposed between the beams A and B, the pedestals I I, secured to the said top beams and embracing the sides of the journal-boxes, as set forth and shown.

In testimony whereof I have hereunto signed my name this 27th day of November, 1889.

EDGAR PECKHAM. [L. S.]

Witnesses:

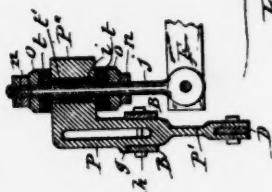
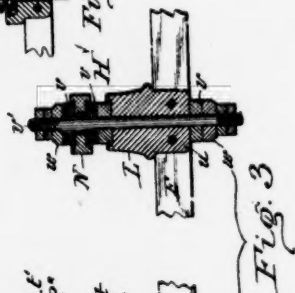
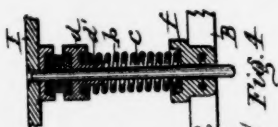
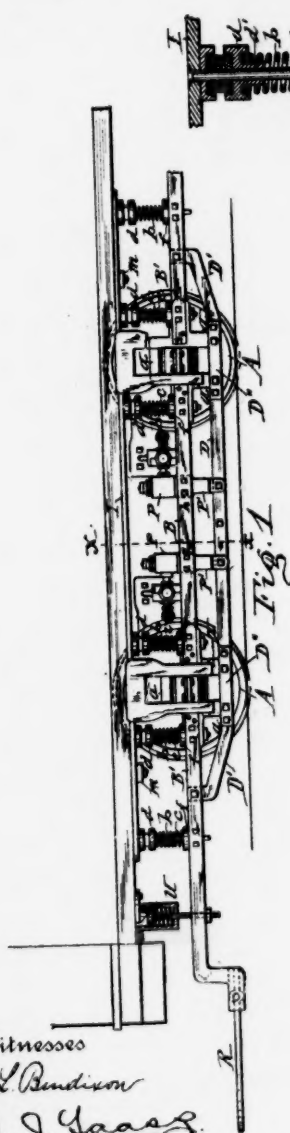
C. H. DUELL,  
H. M. SEAMANS.

No Model.)

E. PECKHAM.  
CAR TRUCK.

No. 464,253.

Patented Dec. 1, 1891.



Witnesses

C. L. Burdison

J. J. Gaatz.

Inventor:

Edgar Peckham

By *his* Attorneys

Abney, Lauret Knell



(No Model.)

2 Sheets—Sheet 2.

E. PECKHAM.  
CAR TRUCK.

No. 464,253.

Patented Dec. 1, 1891.

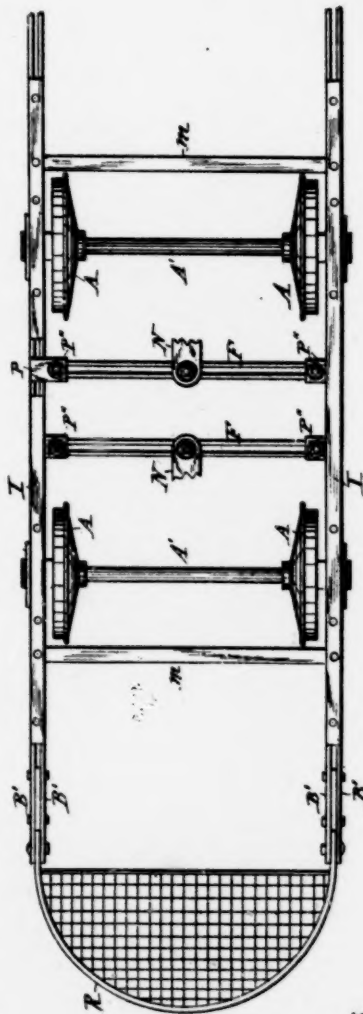


Fig. 5

Witnesses

C. L. Rudison

J. J. Looney

Inventor

Edgar Peckham

By his Attorney

Hull, Lacey &amp; Smith





# UNITED STATES PATENT OFFICE.

EDGAR PECKHAM, OF KINGSTON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PECKHAM MOTOR TRUCK AND WHEEL COMPANY, OF SAME PLACE.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 464,253, dated December 1, 1891.

Application filed October 30, 1890. Serial No. 369,787. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR PECKHAM, of Kingston, in the county of Ulster, in the State of New York, have invented new and useful Improvements in Car-Trucks, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the trucks of electric cars carrying the motor on the trucks.

The chief object of the invention is to provide the truck with a motor support or hanger which shall permit the armature to be readily removed through either the top or bottom of the truck, and also allow the motor sufficient lateral play to avoid cramping the same when the car is traversing a curve in the road.

The object of this invention, also, is to utilize the coupling-bolts of the car-springs for staying the car-body laterally, so as to prevent its shifting from its requisite position over the truck.

To that end the invention consists in the improved construction and combination of parts hereinafter fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a side elevation of a car-truck embodying my improvements. Fig. 2 is a vertical transverse section on line *x x*, Fig. 1. Fig. 3 shows enlarged vertical transverse section of the motor-hanger. Fig. 4 is an enlarged vertical transverse section of one of the car-springs with the lateral stay of the car-body, and Fig. 5 is a top plan view of the truck.

Similar letters of reference indicate corresponding parts.

A A represent the car-wheels fixed to their axles A' A', which are journaled in the boxes C C in the usual and well-known manner. Upon the boxes C C are hung the yokes a a, which embrace the sides of said boxes and extend below the same. Between the yokes on each side of the truck are longitudinal parallel bars B B, which are rigidly secured at their ends to the inner vertical limbs of the yokes and preferably at the sides of the journal-boxes C C. To the outer limbs of the yokes and in line with the bars B B are at-

tached longitudinal bars B' B', which extend nearly or quite to the ends of the car and have the life-guard R attached to them and extending beyond the end of the car-body. The said bars B and B' are braced by a longitudinal truss-bar D, secured to the lower ends of the inner limbs of the yokes a a, and end braces D' D', extending upward from the lower ends of the outer limbs of the yokes and attached to the bars B' B' some distance from the yokes. Straps D'' D'' extend across the lower ends of the yokes and are connected thereto and to the adjacent portions of the truss bars and braces D D' by means of bolts which are removable to allow the journal-boxes to be removed downward from the truck-frame when desired. The car-body is supported on the side bars B B and B' B' by springs b b. To stay the body both laterally and longitudinally over the truck and at the same time retain the springs b b vertically on the truck, I rigidly attach either to the car-sill or to the longitudinal top bars I I depending posts c c, which pass through caps d, springs b, and base-plates f of said springs, and are allowed to slide vertically in the same, as shown in Fig. 4 of the drawings. The said base-plates being firmly attached to the bars B B' serve to guide the posts c c vertically and prevent the car-body from shifting either laterally or longitudinally over the truck. The caps d of the springs being usually thin plates, I form with downwardly-extending tubular bosses d', which receive the posts c c through them, as shown in Fig. 4 of the drawings. Said tubular bosses serve as guides for said posts and for the caps. The free ends of the bars B' B' I provide with additional supports by connecting said portion of the bars to the car-body by means of spring-hangers U.

In order to obviate obstructions to mounting on the truck a car-body having cross-beams secured to the under side of its end portions, and to also afford ample room to accommodate a rheostat when desired to be applied to the truck, I dispense with the cross-bars, which are usually attached to the ends of the side bars of the truck-frame, and in

Here follow diagram marked p.p

lien of said end cross-bars I tie the two sides of the truck-frame together by means of cross-bars *m*, secured to the longitudinal top beams I I of the truck near the wheels A A, as best seen in Fig. 5 of the drawings.

Between the journal-boxes on each side of the truck I mount on the bars B B one or two pedestals P P, according to the number of motors to be connected to the truck. Said pedestals, rising from the side bars B B, are inserted between the bars B B and preferably supported thereon by shoulders *g* on the pedestals riding on top of one of the bars B. By means of bolts *h*, passing transversely through the said bars and intervening portions of the pedestals, the latter are retained in position. Each of the pedestals P is formed with a downward extension P', the lower end of which is bifurcated and embraces thereby the lower longitudinal truss-bar D, as shown more particularly in Fig. 5 of the drawings. The upper end of the pedestal is formed with a horizontal offset P'', extending inward some distance beyond the inner bar B, and this offset has an eye *i* extending vertically through it. Through this eye passes the shank of a bolt *j*, which is secured in a suspended position by nuts *n* and washers *o*, connected to the bolt above and below the offset P''.

To the lower ends of the two bolts *j*, at opposite sides of the truck, are pivotally connected two parallel cross-bars F F, and to said cross-bars, at a point about midway between the bolts *j*, is secured the motor-support II. In order to allow this support to rock laterally, I make the eye *i* sufficiently larger than the bolt to allow the latter to move laterally and interpose between the offset P'' and washers *o* soft-rubber cushions *t*, and by surrounding the portion of the bolt which is in the eye *i* with a rubber tube or lining *l* the motor-hanger becomes insulated from the truck-frame. The motor-support II may be of any suitable construction, according to the style of motor employed. My preferred form of the motor-support consists of the prop L, which is mounted on the cross-bars F F and is rigid and formed with a downwardly-projecting tenon *v*, which passes between the cross-bars and is bolted or riveted thereto. Over the top of the aforesaid prop is the heel N of the motor. Between this heel and top of the prop is interposed a soft-rubber cushion *r*, and a similar cushion is placed upon the heel N. Vertically through the two cushions and intervening heel and through the prop L is a bolt-hole for the reception of the bolt *c*, which is provided with nuts and washers *w* at both ends. If desired, another cushion *v* may be inserted between the bottom of the cross-bars F and subjacent washer *w*. By means of the aforesaid nuts the heel of the motor is securely retained on its support. The aforesaid cushions serve to relieve the motor from the severe jars incident to the vertical thrust of the heel of the motor when starting said motor. By placing on the portion of the

bolt *c* which is within the heel N a bushing of rubber or other non-conducting material the motor becomes insulated from its support II.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric-motor truck, the combination, with longitudinal side bars supported on the journal-boxes, of pedestals mounted on said side bars and rising from the same, cross-bars suspended from said pedestals, and a motor-support mounted on said cross-bars, as set forth.

2. In an electric-motor truck, the combination, with longitudinal side bars supported on the journal-boxes, of pedestals mounted on said side bars and formed with inward offset sets, bolts suspended from said offsets, cross-bars connected to said bolts, and a motor-support mounted on said cross-bars, as set forth and shown.

3. In combination with the longitudinal side bars supported on the journal-boxes, pedestals mounted on said side bars and formed with inward offsets, bolts suspended from said offsets and oscillatory laterally in their connection, cross-bars pivotally connected to said bolts, and a motor-support on said cross-bars, as set forth.

4. In combination with the side bars B B and truss-bar D, the pedestal P, secured to said side bar and formed with the downward extension P', connected to the truss-bar, substantially as set forth and shown.

5. In combination with the side bars B B and truss-bar D, the pedestal P, inserted between the side bars and secured thereto and formed with the downward extension P', having its lower end bifurcated and embracing the truss-bar and secured thereto, substantially as described and shown.

6. In combination with the side bars B B and truss-bar D, the pedestal P, secured to said side bars and formed with the inward offset P'' and downward extension P' and secured by the latter to the truss-bar, cross-bars F, hung on the offset P'', and a motor-support on said cross-bars, as set forth.

7. In combination with the side bars B B, the pedestal P, formed with the inward offset P'', and with the vertical eye *i* in said offset, the bolt *j*, passing through said eye and provided with nuts and washers above and below the aforesaid offset, rubber cushions *t*, interposed between the offset and washers, the cross-bars F F, connected to the lower end of the said bolt, and a motor-support on said cross-bars, substantially as set forth and shown.

8. In combination with the side bars B B, the pedestal P, mounted thereon and formed with the offset P'', and with the vertical eye *i* in said offset, the bolt *j*, passing through said eye and provided with nuts and washers above and below the offset, rubber cushions interposed between the offset and washers, a rubber lining surrounding the bolt in the eye *i*,

cross-bars F F, pivotally connected to the lower end of the bolt, and a motor-support on said cross-bars, as described and shown.

9. In combination with the cross bars F F, the prop L, formed rigid and provided with, a vertical bolt-hole, the heel N, extending over the prop and perforated, the rubber cushions v v on top and bottom of said heel, and the coupling-bolt v', passing through said prop and superincumbent heel and cushions, as set forth and shown.

10. The combination, with the side bars of the truck-frame and car-body, of the spring-supporting base f, rigidly secured to said side bars, the spring b, seated on said base, the cap d on the spring and provided with the tubular

boss d', and the post c, rigidly secured to the car-body and passing freely through the afore-said base, tubular boss, and intervening spring, substantially as set forth.

11. In combination with the car-body, the truck-frame extended to the ends of the car-body, life-guards attached to the ends of the truck-frame, and spring-hangers connecting the latter to the ends of the car-body, as set forth and shown.

In testimony whereof I have hereunto signed my name this 10th day of October, 1890.

EDGAR PECKHAM [L. S.]

Witnesses:

WILLIAM SUTPHEN,  
J. H. BURTON



(No Model.)

2 Sheets—Sheet 1.

J. H. GRAHAM.  
CAR TRUCK.

No. 503,044.

Patented Aug. 8, 1893.

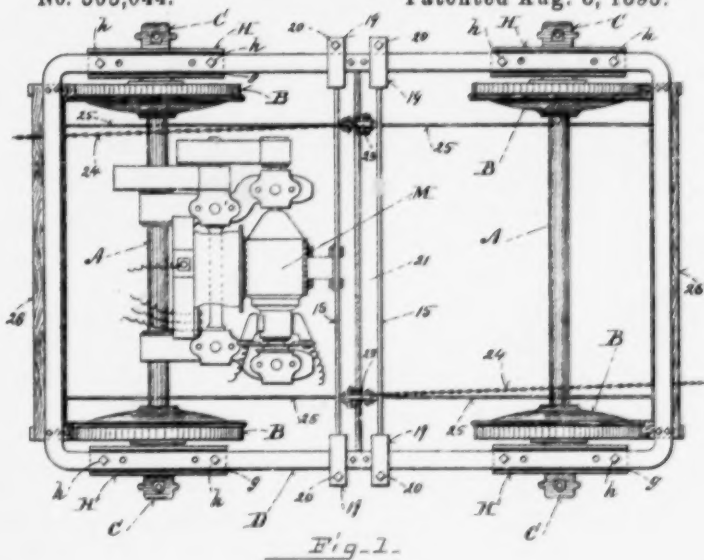


Fig. 1.

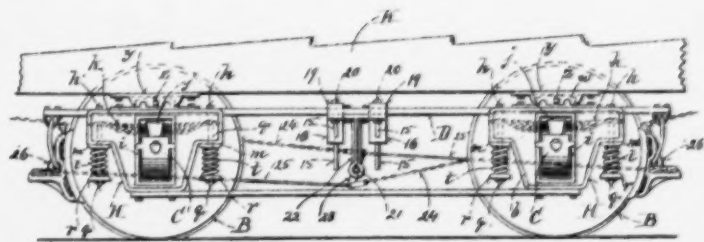


Fig. 2.

Witnesses:  
J. C. Smith  
Charles Hall

INVENTOR:  
John H. Graham,  
BY C. A. Shaw, Atty.



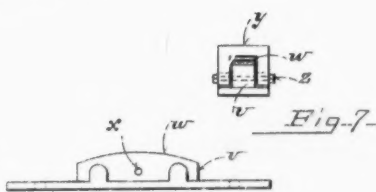
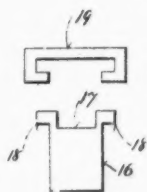
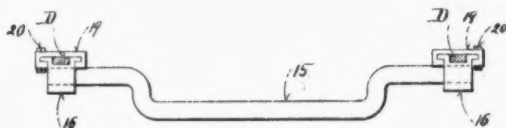
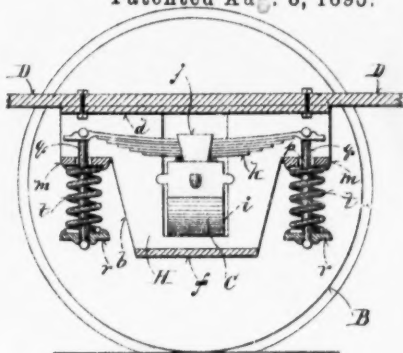
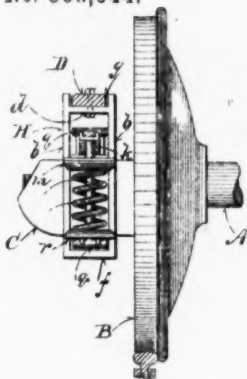
(No Model.)

2 Sheets—Sheet 2.

J. H. GRAHAM.  
CAR TRUCK.

No. 503,044.

Patented Aug. 8, 1893:



WITNESSES:-  
J. J. Surgen  
E. W. Kimball

John H. Graham,  
#39 C.A. Shaw & Co.,  
ATTYS.





# UNITED STATES PATENT OFFICE.

JOHN H. GRAHAM, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE CONSOLIDATED RAILWAY SUPPLY COMPANY; OF SAME PLACE, AND OF PROVIDENCE, RHODE ISLAND

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 503,044, dated August 8, 1893.

Application filed February 6, 1893. Serial No. 461,375. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. GRAHAM, of Boston, in the county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Cars, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view of my improved street-car truck; Fig. 2 a side elevation of the same; Fig. 3 a side elevation enlarged showing the pedestal and method of mounting the truck frame on the axles; Fig. 4 an edge elevation of the same; Fig. 5 a front elevation of one of the arch-bars; Fig. 6 elevation showing the arch-bar locking mechanism; Fig. 7 an end elevation of the castings connecting the frame and car-body; and Fig. 8 a side elevation of the pivot-block.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates especially to improvements in trucks for electrically propelled street-cars, and a brake-mechanism therefor; and it consists in certain novel features hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation:

In the drawings, A represents the car-axes supported on wheels, B, and bearing journal-boxes, C, in the ordinary manner.

The truck-frame, D, is approximately rectangular and comprises a flat metallic-bar. Said frame is mounted on the pedestals, H, supported on the boxes, C. These pedestals comprise two parallel plates, b, connected near their tops by a cross-piece, d, and at their lower ends by a similar cross-piece, f. The sides, b, are extended vertically above the cross-piece, d, forming a groove, g, longitudi-

nally of the pedestal in which the frame, D, rests and is secured by bolts, h. The pedestal is provided centrally with a transverse opening through which the journal-boxes, C, project.

Mounted centrally in a suitable clamp, j, secured on the top of the journal boxes between the side-plates, b, of the pedestal there is a half-elliptical spring, k, curved vertically upward and containing as many leaves as will afford sufficient rigidity for the purposes hereinafter described. At each end the side-plates, b, of the pedestal are connected by a cupped-piece, m, disposed vertically under the ends of the spring, k, and provided with a central opening, p, shown in Fig. 3. A T-rod, q, is passed through said opening and through the end of the spring, k. On the lower ends of said rods and supported by their heads there are cups, r. Resting in said cups and butting in the rigid cup, m, there are spirally-coiled springs, l, of like tension in relation to the semi-elliptical spring.

The weight of the car-body on the truck-frame, D, forcing the pedestals downward is cushioned by the coiled springs, l. As the load on the car increases these springs still serve to cushion it until their limit is reached when the downward pull on the T-rods, q, for any further increase of the load, is supported by the semi-elliptical springs, k. By this arrangement of parts and springs, all variations in the load on the car are cushioned effecting a result not attainable by the coiled-springs in ordinary use which are of necessity so wound to resist the maximum load on the car that they will not compress to cushion a light load, or the weight of the car-body.

Centrally over each pedestal a pivot-block, v, is bolted to the frame D. This block is shown in Fig. 8, and comprises a vertically curved head, w, through which a bolt-opening, x, is formed. An approximately U shaped casting, y, (see Fig. 7) is bolted to the car-body, K, and astrides the head, w, of the pivot-blocks, said blocks engaging within said castings and forming the bearing-points of the car-body on the truck-frame. Bolts, z, passing through the sides of the casting and

Here follow diagrams marked p. 285-286

the opening, *z*, of the pivot-block head, secure the same together.

The motor, *M*, of which one or more may be employed in the ordinary way is supported from the axle, *A*, at one side and an arch-bar, *15*, connecting the side-bars of the truck frame, *D*. The ends of the arch-bar, shown in elevation in Fig. 5, pass through locks, *16*, which are provided on their upper faces with a groove, *17*, of size suitable to receive the side-bars of the frame. Flush with said groove the blocks, *16*, are provided with laterally projecting flanges, *18*. A dovetailed cap or locking block, *19*, (see Fig. 6) receives the flanged heads of the blocks, *16*, locking the frame therein. One of these arch-bars, *15*, is employed for each motor. The blocks, *19*, are held by bolts, *20*, (see Fig. 2).

A brake-mechanism for the truck comprises a rock-bar, *21*, supported and fitted to rotate in brackets, *22*, bolted to the frame, *D*, between the arch-bars. Fast or loose on said lock-bar as may be deemed preferable there are two cranks or levers, *23*, fitted to swing vertically. A chain, *24*, connects each crank or lever by an end with the ordinary brake-staff. The opposite end of said levers, *23*, are connected by rods, *25*, with the brake-beam, *26*, hung from the truck-frame in the ordinary manner. By this arrangement as the brake-staffs are actuated at their end of the car both brake-beams of the truck are operated simultaneously in manner which will be readily understood by all conversant with such matters without a more explicit description.

I do not confine myself to the use of coiled springs, *l*, as any form of spring of less tension than the semi-elliptical spring may be substituted therefor without departing from the spirit of my invention, the primary feature of which consists in so grading the springs supporting the car-body that the variations in the load may be compensated for.

Having thus explained my invention, what I claim is—

1. In a car-truck the combination of a semi-elliptical spring supported on an axle-box; springs of less resistance than the semi-elliptical spring supported therefrom and a pedestal supported by said springs.

2. In a car-truck a semi-elliptical spring supported on an axle-box in combination with coiled springs supported from the ends thereof and a pedestal supported by said coiled springs, substantially as described.

3. In a car-truck the combination of a frame-supporting pedestal; a semi-elliptical spring mounted on the car-axle; rods pendent from the ends of said spring; coiled springs supported by said rods and carrying said pedestal.

4. In a car-truck, the combination with the semi-elliptical spring secured to the axle-box, of the T-rods pendent therefrom, the coiled springs supported on said rods and the pedestal supported by said springs.

5. The pedestal, *11*, flanged to receive the truck-frame in combination with the semi-elliptical spring, *k*, supported on an axle-box; rods pendent from the ends of said spring; coiled springs mounted on said rods and supporting said pedestal.

6. The combination with the wheels, axle and journal-boxes of an inverted semi-elliptical spring supported on said boxes, coiled springs supported from the ends of said semi-elliptical spring and the pedestal, *11*, bearing on said coiled springs and supporting the truck-frame.

7. In a car-truck, the pedestal, *11*, provided with the groove, *g*, in combination with the frame, *D*, secured in said groove; the semi-elliptical springs, *k*, mounted centrally on an axle-box; the rods, *q*, pendent from the ends of said springs and the coiled springs mounted on said rods and supporting said pedestal, substantially as described.

8. In a car-truck, an electric-motor connected with an axle of said truck; flanged locks grooved to receive the truck-frame; dovetailed blocks for locking said frame therein and an arch-bar mounted in said flanged-box and supporting said motor.

9. In a car-truck, the combination with the frame of the flanged blocks, *16*; the dovetailed blocks, *13*, for locking said frame therein and the arch-bar, *15*, supported in said block, *16*, substantially as and for the purpose set forth.

10. The combination with a car-body of a truck-frame; vertically curved pivot-blocks on said frame and bearings for said blocks on the car-body.

11. The combination with a car-body of a truck; the pivot-blocks, *v*, on the frame of said truck; the castings, *y*, on said car forming steps for said blocks and secured thereto.

JOHN H. GRAHAM.

Witnesses:

K. DUFFEE,  
O. M. SHAW

223

(No Model.)

3 Sheets—Sheet 1.

W. S. ADAMS.  
CAR TRUCK.

No. 538,858.

Patented May 7, 1895.

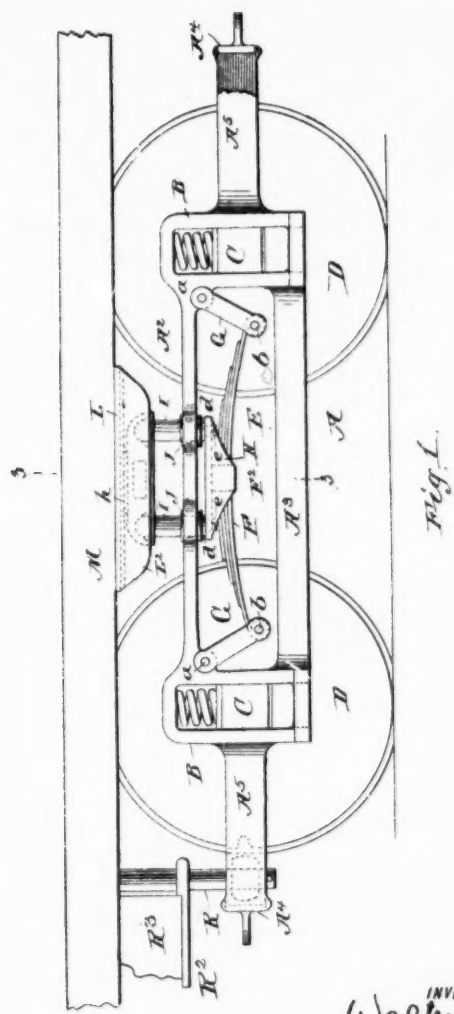


Fig. 1.

WITNESSES:

*Mr Benjamin*  
*Wm Jacobson*

INVENTOR

*Walter S. Adams*

BY

*Joseph L. Levy*

ATTORNEY



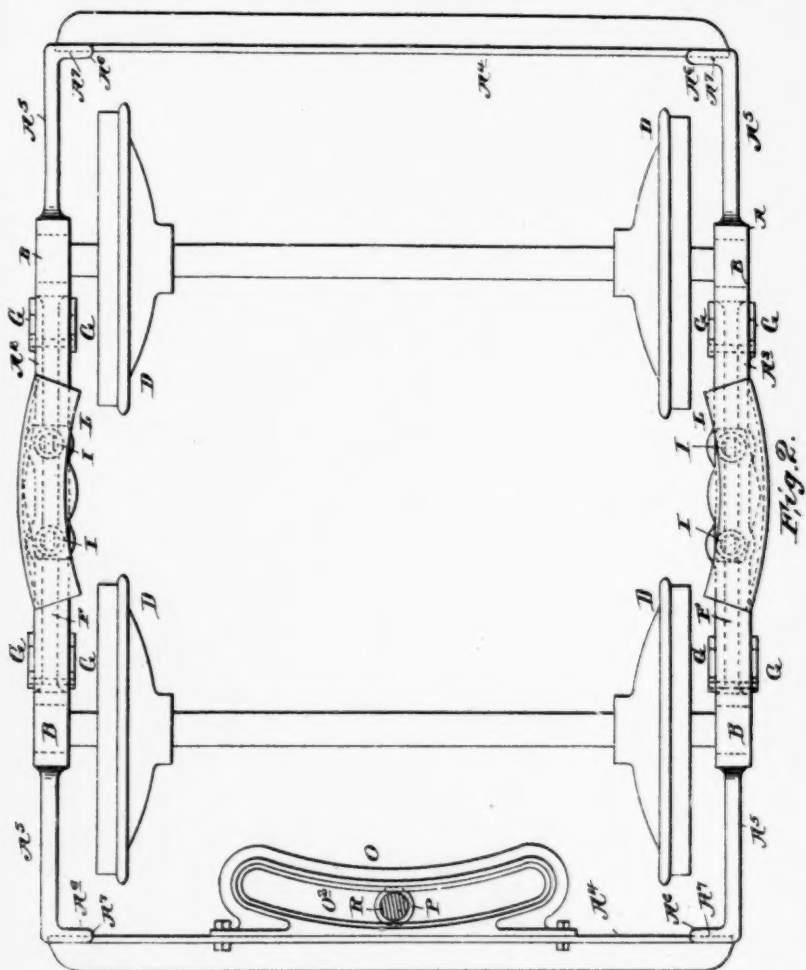
(No Model.)

224  
3 Sheets—Sheet 2.

W. S. ADAMS.  
CAR TRUCK.

No. 538,858.

Patented May 7, 1895.



WITNESSES:

*Wm. Benjamin*  
*Wm. Jacobson.*

INVENTOR

*Walter S. Adams*

BY

*Joseph L. Levy*

ATTORNEY



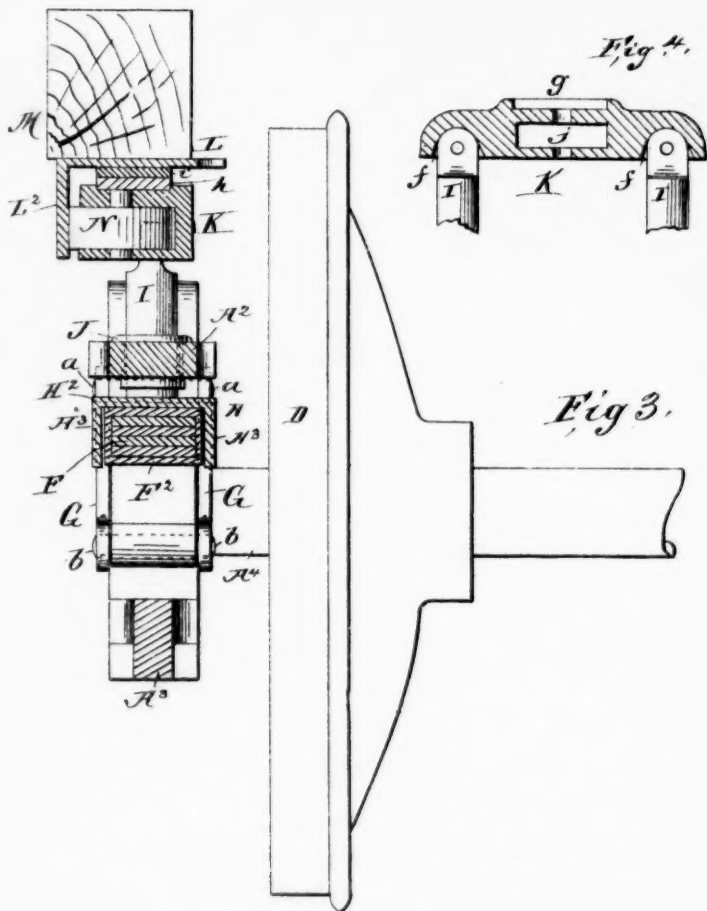
(No Model.)

W. S. ADAMS.  
CAR TRUCK.

3 Sheets—Sheet 3.

No. 538,858.

Patented May 7, 1895.



WITNESSES:

C. H. B. *[Signature]*  
Wm. Jacobson.

INVENTOR  
Walter S. Adams  
BY *[Signature]*  
ATTORNEY





# UNITED STATES PATENT OFFICE.

WALTER S. ADAMS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
JOHN A. BRILL, OF SAME PLACE.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 538,853, dated May 7, 1895.

Application filed February 16, 1895. Serial No. 638,612. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. ADAMS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Car-Trucks, of which the following is a specification.

One object of this invention is to provide improved means for resiliently supporting a car body upon a car truck, and a further object is to improve certain details of construction of the axle box frame.

The invention consists in an axle box frame carrying a semi-elliptical spring, having its concave surfaces facing downwardly, and spring posts sustained by said spring between its ends, said posts being guided by the upper chord of the axle box frame, and devices for connecting the car body with said posts.

The invention also consists in the novel details of improvement and the combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein—

Figure 1 is a side elevation of a car-truck embodying my improvements, showing a portion of a car-body mounted thereon. Fig. 2 is a plan view of the car-truck. Fig. 3 is an enlarged cross-section illustrating my improvements on the plane of the line 3 3 in Fig. 1; and Fig. 4 is an enlarged detail, partly in section, of the spring-posts and the bearing.

In the accompanying drawings, in which similar letters of reference indicate corresponding parts in the several views, the letter A indicates an axle box frame. B are its axle box yokes; C, the axle boxes, and D the wheel, which may all be of suitable or desired construction.

In the example shown the axle box frame A has an upper chord A<sup>1</sup> and a bottom chord A<sup>2</sup>, forming the side bars between the yokes B and defining a space E, in which part of my improvements may be located.

At F is a semi-elliptical spring, the leaves of which are shown bound together by a strap F<sup>1</sup>, said spring being located beneath the upper chord A<sup>1</sup> and within the space E. The ends of the spring F are so supported that they may move under the bending influence of a superposed car body.

In the example shown the ends of the spring F are supported by links G, which are pivotally carried by the axle box frame. By preference the links G are arranged in pairs, the ends of the spring F being located between the links. The links G are supported at their upper ends by pivots a carried by the chord A<sup>1</sup>, and at their lower ends said links are connected by pivot bars b, upon which the ends of the spring F rest, being preferably curved around said pivots. By this arrangement the spring F is pivotally supported, so as to move endwise under the weight and motions of the car body, the links G turning on their pivots for this purpose.

Upon the spring F, at its central portion, is mounted a saddle H, adapted to have a slight rocking motion thereon, said saddle being shown composed of a top plate H<sup>1</sup> having depending side webs H<sup>2</sup> forming a channel to receive the spring F.

At I, I are spring posts resting on the saddle H, and movably connected therewith. The posts I have reduced ends which pass through the top of the saddle and form shoulders d that rest on the saddle H, and may be held in position by cotter pins e passing through the reduced ends of the posts I beneath the saddle H. The apertures in the saddle H may be enlarged to give freedom of movement to the posts I.

The posts I are journaled in the upper chord A<sup>1</sup> of the axle box frame, bushings j being preferably provided for said posts, the chord A<sup>1</sup> being enlarged to receive said bushings. Provision is made for allowing the posts I to have a slight longitudinal or lateral movement relatively to the chord A<sup>1</sup>, either by making enlarged openings in said chord for said bushings, or by making the bushings elastic, or else by allowing play between the posts and the bushings, so as to permit slight movement of said posts under the rocking movements of the car body.

The car body is to be supported on the posts I, I by devices which may be of ordinary or suitable construction. In the drawings the posts I are shown connected by a casting K, into which forms the truck bearing, and has recesses f, in which the upper ends of the posts I may be pivoted. (See Fig. 4.)

The casting K has a top recess g in which

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 Here follow diagrams marked p. 6 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.

is located a friction plate *h*. *I* is a guide plate secured to the under side of the side sill *M* of a car body. (Not shown.) The plate *M* is curved on an arc derived from the pivotal center *x* (Fig. 2) of the car truck, and from the plate *I*, depends a web *L*, following the curve of the plate *I*, and to the plate *L* is secured a rub plate, which bears on the friction plate *h*.

10. *N* is a roller pivotally carried in a recess *j* in the casting *K* to bear against the depending plate *L* to limit and regulate the lateral movement of the car body relatively to the truck, and to properly guide the truck in its pivotal movements beneath the car body.

15 The chord *A*<sup>1</sup>, posts *I*, *I* and saddle *H* form the pedestals for the truck bearing.

One of the cross bars *A*<sup>2</sup> of the truck or axle box frame *A* is shown provided with a casting *O* having a curved slot *O*<sup>1</sup>, in which works a friction roller *P* loosely journaled on a draw bar *R*. The draw bar *R* depends from the car body and may be strengthened by a brace *R*<sup>1</sup> extending from said bar to a support *R*<sup>2</sup> carried by the car body. This draw bar makes a drawing connection between the car body and the axle box frame, which acts in all positions of the truck relatively to the car body. This I do not claim herein.

30 My improved axle box frame is constructed as follows: From the yokes *B*, *B* extend bars *A*<sup>3</sup> having integral and inwardly turned ends *A*<sup>4</sup> provided with recesses *A*<sup>5</sup>, the outer ends of which are closed. The cross bar *A*<sup>6</sup> is *T* shaped, its flat web lying in said recesses. The parts *A*<sup>3</sup>, *A*<sup>4</sup>, *B*, *A*<sup>5</sup> and *A*<sup>6</sup> are preferably made in a single piece of metal, as by forging, and the parts *A*<sup>3</sup> and *A*<sup>4</sup> may be fastened together by rivets or bolts. The cross bar *A*<sup>6</sup> is 40 restrained from transverse movement by the closed ends of the recesses *A*<sup>5</sup>.

By means of my improvements the car body is resiliently supported at the center of the axle box frame, so as to have free up and 45 down, or rocking motion, and it will be understood that the devices described will be located on both sides of the frame *A*.

I do not limit my invention to the precise details of construction shown and described, 50 as they may be varied without departing from the spirit of my invention.

I claim—

1. The combination of an axle box frame, with a semi-elliptical spring supported there- 55 by, spring posts supported directly upon said spring between its ends, guides for the posts above the spring, and means for connecting a car body with said posts, substantially as described.

60 2. The combination of an axle box frame having a side bar, with a semi-elliptical spring supported at its ends on said frame and below said bar and having its concave surface facing downwardly, spring posts on said spring and 65 guided by said side bar, and means for connecting said posts with a car body, substantially as described.

3. The combination of an axle box frame having a side bar, with a semi-elliptical spring 70 pivotally carried by said frame, a saddle on said spring, posts supported by said saddle, and means for supporting a car body on said posts, substantially as described.

4. The combination of a truck frame, with a semi-elliptical spring carried by said frame, 75 a saddle having a movable connection with said spring, posts supported by said saddle, and a bearing having a movable connection with said posts, substantially as described.

5. The combination of a truck frame having 80 a top bar, with a semi-elliptical spring carried by said frame, a movable saddle on the spring, posts supported by the saddle and guided by the top bar, and a bearing movably connected with said posts, substantially as described. 85

6. The combination of an axle box frame having a side bar, with a semi-elliptical spring, 90 links pivotally carried by said frame and supporting the ends of said spring, a saddle or said spring, posts supported by said saddle and guided by said side bar, and means for supporting a car body on said posts, substantially 95 as described.

7. The combination of an axle box frame having a side bar, with a semi-elliptical spring, 95 links arranged in pairs and pivotally suspended from said frame, pivots *b* connecting said links in pairs, the ends of said spring being supported by said pivots, a saddle on 100 said spring, posts supported by said saddle and guided in said side bar, and means for supporting a car body on said posts, substantially as described.

8. The combination of an axle box frame having a side bar, with a semi-elliptical spring 105 movably supported by said frame, a saddle mounted on said spring and consisting of a top plate having depending webs forming a channel to receive said spring, posts having 110 reduced ends received in apertures in said saddle, said posts being guided in said side bar, and means for supporting a car body on said posts, substantially as described.

9. An axle box frame having side bars and yokes, extensions *A*<sup>7</sup> from said yokes provided 115 with integral and inwardly extending ends *A*<sup>8</sup> having recesses *A*<sup>9</sup>, and cross bars *A*<sup>10</sup> located in said recesses, substantially as described.

10. An axle box frame having side bars and yokes, extensions *A*<sup>11</sup> from said yokes provided with integral and inwardly extending 120 ends *A*<sup>12</sup> having recesses *A*<sup>13</sup>, the outer ends of which are closed, and *T* shaped cross bars *A*<sup>14</sup> having their flat webs or sides located in said recesses and fastened therein, the closed ends 125 restraining transverse movement of the cross bars, substantially as described.

Signed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, this 21st day of January, 1905.

WALTER S. ADAMS.

Witnesses:

R. S. REED,

R. W. BROADBENT.

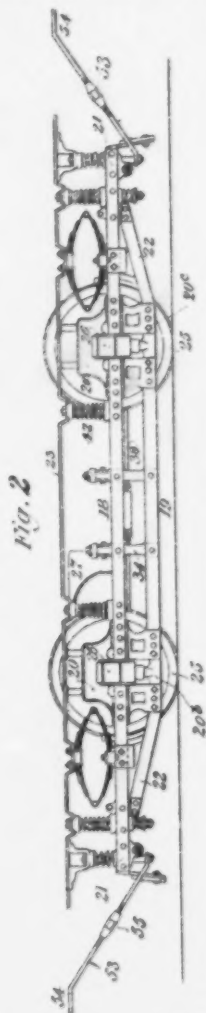
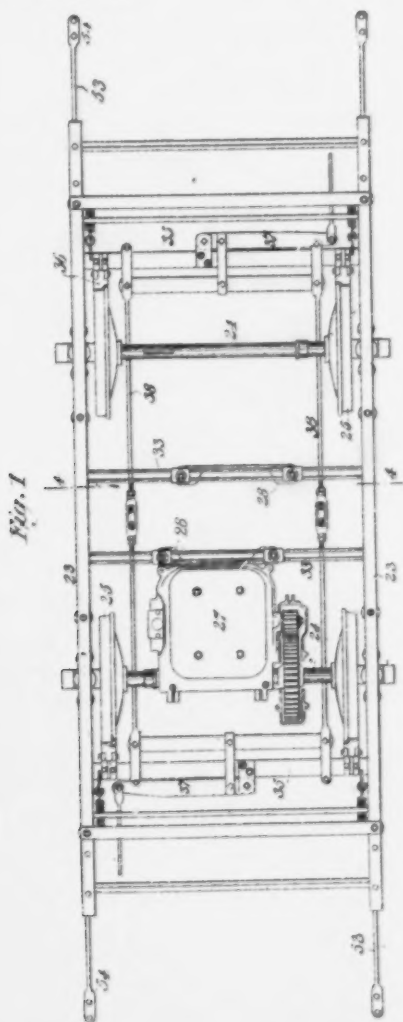
(No Model.)

E. PECKHAM.  
CAR TRUCK.

5 Sheets—Sheet 1.

No. 563,685.

Patented July 7, 1896.



WITNESSES:

J. M. Brown  
W. E. Bowser

INVENTOR:—

Edgar Peckham



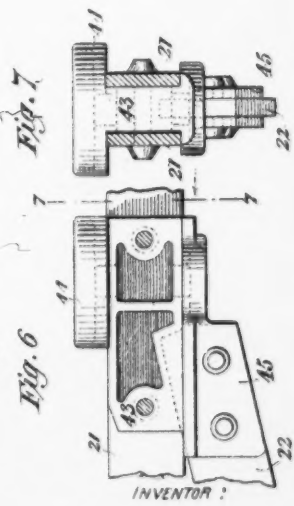
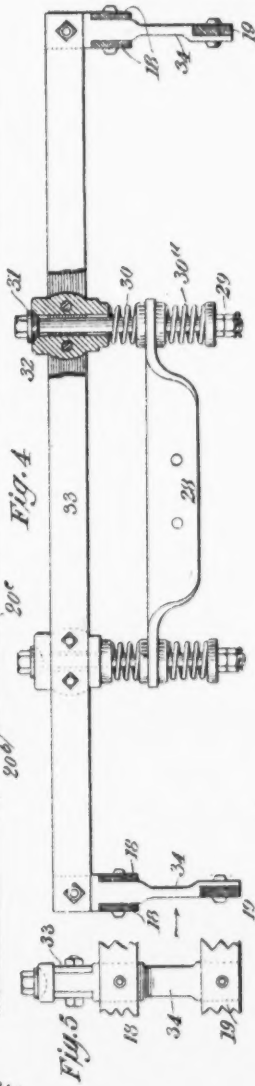
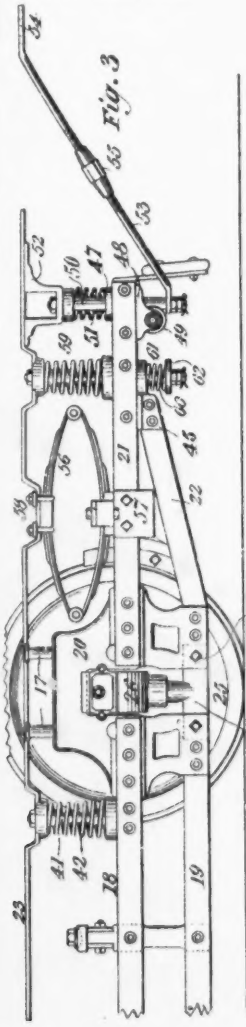
(No Model.)

5 Sheets—Sheet 2.

E. PECKHAM.  
CAR TRUCK.

No. 563,685.

Patented July 7, 1896.



WITNESSES:

*J. E. Bowen*  
*W. E. Bowen*

*Edgar Peckham*  
INVENTOR



230

(No Model.)

5 Sheets—Sheet 3.

E. PECKHAM.  
CAR TRUCK.

No. 563,685.

Patented July 7, 1896.

Fig. 8.

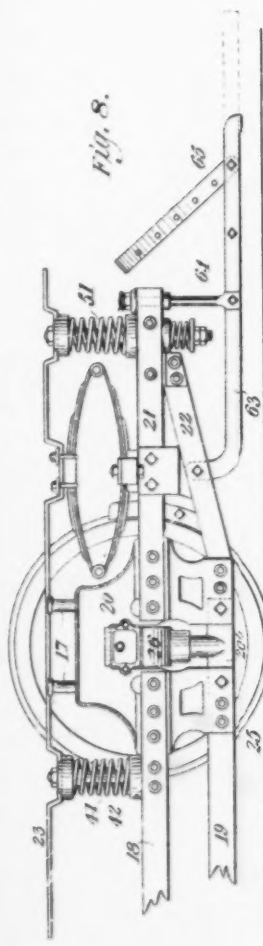
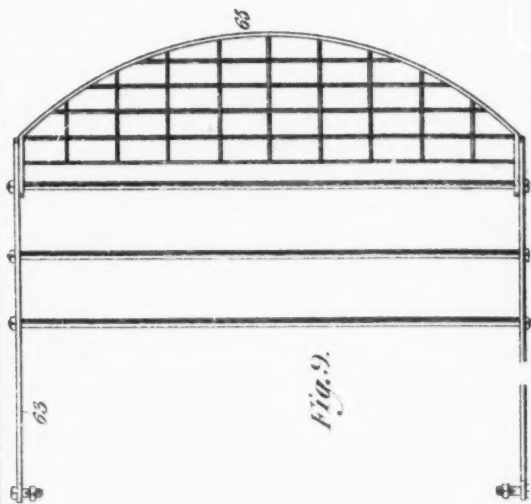


Fig. 9.



WITNESSES:

J. H. Bowen  
W. E. Bowen

Edgar Peckham INVENTOR.





(No Model.)

5 Sheets—Sheet 4

E. PECKHAM.  
CAR TRUCK.

No. 563,685.

Patented July 7, 1896.

Fig. 11.

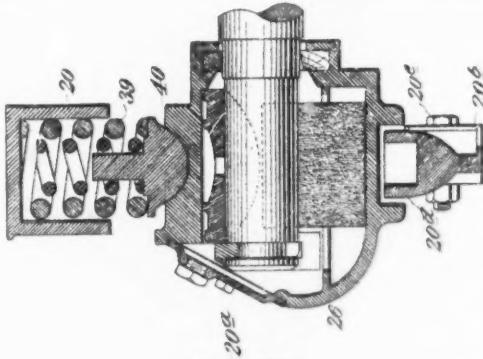
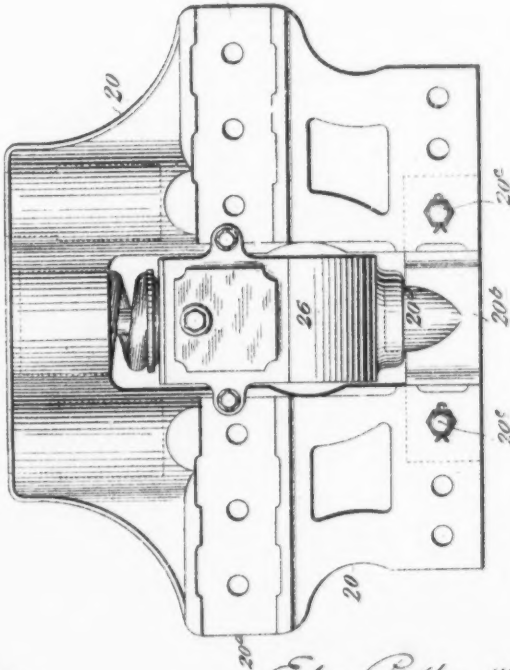


Fig. 10.



WITNESSES:

J. E. Bowen  
W. E. Bowen

Edgar Peckham INVENTOR:



(No Model.)

6 Sheets—Sheet 6

E. PECKHAM.  
CAR TRUCK.

No. 563,685.

Patented July 7, 1896.

Fig. 13.

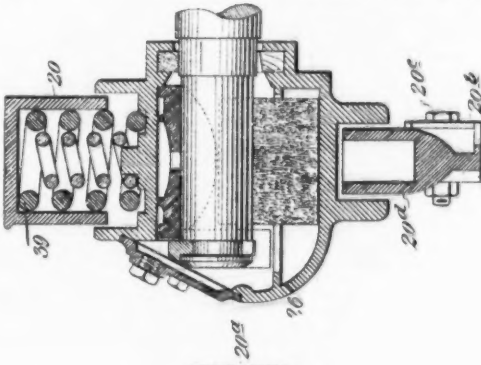
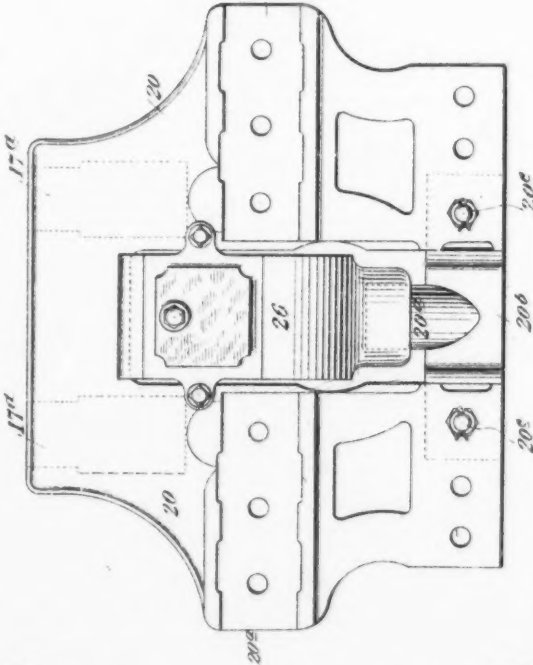


Fig. 12.



WITNESSES:

J. E. Bowen  
W. E. Bowen

INVENTOR: —

Edgar Peckham



# UNITED STATES PATENT OFFICE.

EDGAR PECKHAM, OF KINGSTON, NEW YORK.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 569,685, dated July 7, 1896.

Application filed March 12, 1894. Serial No 503,353. (No model.)

### To all whom it may concern:

Be it known that I, EDGAR PECKHAM, a citizen of the United States, and a resident of Kingston, in the county of Ulster and State of New York, have invented certain new and useful Improvements in Car-Trucks, of which the following is a specification.

This invention relates to car-trucks, and particularly to such as are adapted to support an electric motor by which the truck is propelled.

The invention is hereinafter described in connection with the accompanying drawings, and its object is to relieve the truck-frame from shocks or concussion and to prevent the oscillation of the car when in motion, and this object I accomplish by the means set forth in the following description.

In the accompanying drawings, which form part of this specification, and wherein like features are indicated by like numerals of reference in the several views, Figure 1 represents a plan view of an electric-car truck embodying my invention. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is an enlarged elevation of one end of the truck. Fig. 4 is a cross-section on the line 4-4 of Fig. 1, the brake mechanism being omitted. Fig. 5 is an end view looking in the direction of the arrow of Fig. 1. Fig. 6 is a detail view showing the mode of attachment of the under truss at one end of the truck to the upper longitudinal beam. Fig. 7 is a section on the line 7-7 of Fig. 6. Fig. 8 is an elevation of one end of the truck-frame, showing, besides the arrangement of the elliptic and spiral springs, likewise shown in Figs. 2 and 3, the life-guard and mode of attachment of the same to the truck-frame. Fig. 9 is a plan view of the life-guard. Fig. 10 is a front view of the axle-box and yoke. Fig. 11 is a central vertical section through Fig. 10. Fig. 12 is a front view of a modification of the axle-box as combined with the yoke, and Fig. 13 is a central vertical section through Fig. 12.

Referring to the drawings, 18 represents the upper longitudinal beam, which is preferably duplex, as seen in Fig. 4, and 19 the bracing-beam. These beams on each side of the truck-frame connect the yokes 20 together, the said beams being riveted to the yokes, as indicated. To the outer sides of the

yokes 20 there are riveted longitudinal beams 21, which afford support for springs, as shown, and which beams will be of greater or less length, according to the proportions desired of the spring-base extension. The springs mounted on beams 21 are supported from below by truss-beams 22, riveted to the lower part of the yoke and inclined upward to the beams 21, to which they are suitably riveted, the preferred mode of connecting the truss-beams 22 being shown in Figs. 6 and 7 and described hereinafter. Suitably supported on standards rising from the longitudinal beams 18 is a sill or top chord 23, which coacts with the springs on beams 18 and 21, and also with elliptical springs arranged as hereinafter mentioned, and upon this sill 23 the car-body is adapted to be placed.

The respective sides of the truck-frame are connected together by suitable transverse bars, and the truck-frame is mounted, as usual, upon the axle-boxes, which cooperate with the yokes of the frame.

In the drawings, 24 indicates the axles, 25 the wheels, and 26 the axle-boxes.

The truck-frame as above described does not differ essentially from the truck-frames shown in several of my Letters Patent heretofore granted, the distinguishing characteristics of which being the extended spring-base and under truss-beams for supporting said spring-base. The particular combination of elliptical and spiral springs and tension appliance hereinafter described is, however, one of the improvements forming the subject of this application.

The electric motor 27, which cooperates with gearing on the axles 24 in a manner well understood, is supported by the axles and on motor-hangers 28, which latter are suspended upon rods 29 between spiral springs 30 30', encircling said rods, as shown in Fig. 4. The rods 29 are provided at their upper ends with ball-bearings 31, operating within sockets 32, which are bolted between the duplex transverse beams 33, which are supported by standards 34 at each side of the truck-frame and which are bolted between the longitudinal beams 18 and also to the longitudinal truss-beam 19, as shown in the drawings. By this construction of motor-support the requisite flexible connection is secured for the heel of

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the motor. I do not in this application make any claim, however, to this construction of motor-support, and any other desirable construction may be substituted for it.

- 5 A brake mechanism which may be used with any truck is shown in the plan view Fig. 1, but any other suitable brake mechanism may take its place. In said Fig. 1 the numerals 35 indicate the brake-bars, 36 the brakes, 37
- 10 the operating-levers of the brakes, and 38 the connecting-rods by which the brakes at both ends of the truck are operated simultaneously from either end of the truck through suitable instrumentalities.
- 15 The yoke 20 is an independent structure riveted to the frame and is provided at its respective sides with openings 20<sup>a</sup> to receive the ends of the beams 18 and 21, which, as explained, are riveted to the yoke. At its bottom the yoke is also provided with holes to receive the rivets which connect the beams 19 and under truss-beams 22 thereto. 20<sup>a</sup> indicates a detachable connecting-piece between the lower extremities of yoke 20, held in place
- 25 by bolts 20<sup>b</sup>. This connecting-piece 20<sup>a</sup> is provided with the projection 20<sup>c</sup>, which is adapted to enter an opening or socket in the bottom of the axle-box 26 and thus furnish a loose connection between the bottom of the
- 30 axle-box and the detachable piece 20<sup>a</sup>, and by this means, in connection with the joint at the top of the axle-box, the latter is maintained in its proper position with reference to the yoke and the truck-frame. By removing
- 35 the bolts 20<sup>b</sup> the pieces 20<sup>a</sup> may be readily removed from the yoke structure and thus permit the axle-box to be detached from the truck-frame.

- To relieve the truck-frame from shocks and concussion and insure the easy riding of the car, I arrange between the top of the axle-box 26 and the yoke 20 a spiral spring 39, the yoke being hollowed out, as shown, to receive the spring and maintain it in operative position. In Figs. 10 and 11 the axle-box is provided in its top surface with a semispherical depression within which operates a guide-piece 40 for the spring 39, said guide-piece having a semispherical bottom which cooperates with the depression in the top of the axle-box, thus forming a ball-joint partaking of a universal motion. The spring 39, Fig. 11, is mounted on the guide-piece 40, whose stem projects partly through the spring, as shown, and as the spring is fitted into the opening in the yoke it is thus suitably guided and prevented from becoming displaced. The spring 39 is duplex, consisting of an inner and outer spiral, which I find to be a desirable form of construction for the present purposes. In
- 60 Figs. 12 and 13 the top of the axle-box is provided with a depression having a central vertical stud to receive the spring 39 and assist in maintaining it in position. This construction does not possess the quality of a universal joint, but in many ways is quite as well adapted for the purposes intended. Attached

to the sill 23 are guide-rods 17, which enter sockets 17<sup>a</sup> in the tops of the yokes 20.

Upon the longitudinal beams 18, between the yokes, there may be mounted upon suitable standards 41, whose upper ends pass through depressions in the sill 23, as shown, (whereby the nuts which secure said standards to the sill are below the plane of the sill,) spiral springs 42 for affording support to the car-body centrally.

The improvements which I have applied to the ends of the car-truck will now be described. The beams 21, which serve as the extended spring-base, are duplex, as shown, and the outer upper ends of the truss-beams 22 are secured to the same, as indicated in Figs. 6 and 7. In these views 43 indicates a casting having a collar 44 at its top and a lateral projection 45 at the bottom. This casting is riveted between the members of the duplex beam 21 (see Fig. 7) with the collar 44 resting on the upper edges of the beam, the lateral projection 45 being below the lower edges of said beam. The lateral projection 45 is provided with a central opening which receives the upper and outer end of the under truss-beam 23, which is riveted to the casting, as shown, the interior of the casting furnishing a rigid abutment for the end of said truss-beam, as shown in Figs. 6 and 7.

At the extreme end of the duplex longitudinal beam 21 there is riveted between its members a casting with a collar 47, which rests upon the upper edge of said beam, and with a depending bracket 48 below the under edge of the beam. In bracket 48 there is journaled a roller 49, with which rod 50, supporting a preferably duplex spiral spring 51, above the collar 47, and passing through an opening in the bracket, cooperates. The spiral spring 51 abuts at its upper end against a collar on said rod and the extreme upper end of the rod is secured by a nut within a bracket 52, affixed to the sill 23. To the lower end of rod 50 there is suitably secured an end truss 53, extending outwardly and upwardly and having at its extreme end a horizontal portion 54 and adapted to be maintained by means of a turnbuckle device 55 in the same plane as the top of the sill 23. The end truss 53 may be formed integral with the rod 50, and I prefer to so make it. The object of the extended end truss 53 is to prevent the teetering or oscillation of the car and also to support the ends of car-bodies of unusual lengths. It will be noticed that said end truss (whether its vertical member 50 is integral with member 53, as in Fig. 12, or connected thereto, as in Figs. 1 and 13) connects with the upper chord 23 of the truck-frame by means of bracket 52, and at its opposite end or extension is adapted to extend under the car-body and support the same at its outer end. By this arrangement the requisite flexible support is afforded at the extreme ends of the car-body, which is an important consideration when car-bodies of unusual length are employed.

Next to the yoke 20 I arrange an elliptical spring 56, supported in a bracket 57, riveted to the duplex beam 21 and connected by a suitable clamp 58 to a depressed portion of the sill 23, as shown. The elliptical springs 56—there being four to each truck, one near each end of each side frame—thus firmly unite the horizontal end beams 21 with the upper chord 23 of the truck structure. In combination with this elliptical spring, located as shown, I employ a spiral spring 59. The said spiral spring is arranged in advance of the elliptical spring and is mounted upon a rod having its upper end connected to a depression in the sill 23, as shown, and having its lower end extending through the bracket 43, riveted as explained between the members of the duplex beam 21. The lower end of this rod, which is indicated by 60, extends beneath the bracket 43 a sufficient distance and is provided with a spiral tension-spring 61, which is held in place between the bracket and an adjustable nut 62. The function of the under tension-spring 61 is to take up lost motion of spiral spring 59 and to keep the same in proper tension, thereby providing at this point of the truck structure what I term a "tension" appliance.

By locating the elliptical springs adjacent to the yokes and the spiral springs in advance of the elliptical springs I overcome serious objections heretofore encountered when making use of elliptical springs in truck structures, as I am enabled to bring the weight of the car-body more directly upon the elliptical springs than upon said spiral springs and thus provide against oscillation of the car-body that would otherwise take place; and by this disposition of the springs I am also enabled to combine advantageously with the spiral spring 59 the lower tension-spring 61, thus providing an effective tension device serving to prevent breakage of the elliptical springs by up-thrusts of the truck, the said tension device also relieving the car from shocks by cushioning the nut 62 at the bottom of the rod or bolt 60.

The spiral springs 59 61, located as explained, also afford a more extended spring-support for the car-body and assist in preventing too oscillation or telescoping of the car. The elliptical spring 56, arranged next to the yoke, as constructed, is made stiffer than the said spiral springs. There are four of these elliptical springs in the truck structure, two at each end of the truck, and it is upon these four elliptical springs that dependence is placed to sustain the car when not loaded, and as the weight of the car is increased the spiral springs come into play to reinforce the elliptical springs.

The elliptical springs 56 are rigidly secured to the top frame or upper chord 23 of the truck and also to the horizontal end extension-beams 21. Thus secured, said springs serve to brace the truck and give it the necessary strength to resist side and end thrusts

when starting and stopping and rounding curves. When only one spiral spring is used in combination with the elliptic spring, as 70 shown in Fig. 8, the spiral spring is preferably provided with an inside buffer-spring, as shown, the inside spiral spring being a little shorter than the outside spiral spring to allow for the weight of the car-body before it comes 75 into action.

To the under supporting truss 22 there are bolted the bars 63, which project outwardly beyond the end of the truck and are supported by the hangers 64, suitably connected 80 to the duplex beams 21. These bars 63 have connected to them near their outer ends the life-guard 65, the connection between the bars 63 and life-guard 65 being a hinged one, whereby the life-guard may be turned upward, as 85 shown in Fig. 8 in full lines, or turned downward on a plane with the bars 63, as shown in dotted lines in said view.

In this application I show a truss-bracing at the ends of the car-truck comprising a diagonal brace, a vertical supporting-bolt connected to the car-sill or the top chord of the truck-frame, and also to the lower end of said diagonal brace, and a roller cooperating with said truss-bracing at or near the juncture of the diagonal brace with the supporting-bolt, 95 but I do not claim the same herein, as it is claimed in a division of the present application, said divisional application having been filed February 29, 1898, Serial No. 881,391. 100

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car-truck, the combination with the yoke of the truck, an extended end beam and a spiral spring mounted on said end beam, of an elliptical spring likewise mounted on said end beam between the said spiral spring and yoke and contiguous to the yoke, substantially 110 as set forth.

2. In a car-truck, the combination with the yoke of the truck, an extended end beam, a truss therefor, and a spiral spring mounted on the upper side of said end beam, of an elliptical spring likewise mounted on said end beam and between said spiral spring and the yoke, substantially as set forth. 115

3. In a car-truck, the combination with the yoke of the truck, an extended end beam and a duplex spiral spring mounted on said end beam, of an elliptical spring made stiffer than said spiral springs and likewise mounted on said end beam, between said duplex spiral spring and yoke and contiguous to the yoke, substantially as set forth. 120

4. In a car-truck, the combination with the yoke of the truck, an extended end beam and a series of spiral springs mounted on said end beam, of an elliptical spring made stiffer than said spiral springs and likewise mounted on said end beam between said yoke and spiral springs and contiguous to the yoke, substantially as set forth. 125

5. In a car-truck, the combination with the

side frames including the yokes, and spiral springs mounted on said frames near their ends, of four elliptical springs mounted on the side frames between the yokes and said spiral springs and contiguous to the yokes, substantially as set forth.

6. In a car-truck, the combination with the side frames including yokes and end beams, 21, and spiral springs mounted on said end beams, of upper chord or frame 23 and four elliptical springs secured to the said end beams, between the yokes and said spiral springs, and also firmly secured to said upper frame or chord 23, substantially as set forth.

7. In a car-truck, the combination with the side frames including yokes, and end beams, 21, and trusses under said end beams, of an upper frame or chord 23, spiral spring between the end beams and the upper chord, and elliptical springs secured to the end beams 21, between the yokes and said spiral springs, and also secured to the upper frame or chord 23, substantially as set forth.

8. In a car-truck, the combination with the yoke of the truck, an axle-box and a spiral spring located between the top of the yoke and the axle-box, of an extended end beam, a spiral spring mounted on said end beam and an elliptical spring made stiffer than said last-mentioned spiral spring and likewise mounted on said end beam between the yoke and spiral spring on the end beam and contiguous to the yoke, substantially as set forth.

9. In a car-truck, the combination with the yoke, end extension-beam 21, upper chord 23, and an elliptical spring mounted on said end beam and connected to said upper chord and arranged contiguous to the yoke, of a spiral spring on the end beam in advance of the elliptical spring, bolt as 60 connected to said upper chord and extending through said spiral spring and beneath the end extension-beam, a spiral tension-spring 61 on the lower end of said bolt and cushioning-nut 62, substantially as set forth.

10. In a car-truck, the combination with the yoke of the truck, an extended end beam and an elliptical spring mounted on said end

beam near the yoke, of a spiral spring likewise mounted on said end beam in advance of the elliptical spring and a spiral tension-spring arranged on the rod or spindle of said spiral spring beneath the under surface of said extended beam, substantially as set forth.

11. In a car-truck, the combination with the yoke of the truck, an extended end beam and an elliptical spring mounted on said end beam contiguous to the yoke, of a spiral spring likewise mounted on said end beam in advance of the elliptical spring and having its rod or spindle extended below said end beam and provided with a tension-spring, and a supporting-truss at the end of said end beam, connected to the sill or upper longitudinal chord of the truck-frame, extending downward beneath the said end beam and projecting outward and upward beneath the car-body, substantially as set forth.

12. In a car-truck, the combination with an extended end beam, a yoke, a bracket as 43 secured to said extended end beam and an under truss as 22 riveted or bolted at one end in contact with the bottom of the yoke and having its other end socketed in the aforesaid bracket, of an elliptical spring mounted on said extended end beam contiguous to the yoke, a spiral spring likewise mounted on said beam in advance of the elliptical spring and having its spindle projecting through said bracket beneath said end beam and provided with a spiral tension-spring beneath the end beam, substantially as set forth.

13. In a car-truck, the combination with the extended end beams as 21 and the under supporting-trusses 22, of the bars 63 rigidly secured to said under supporting-trusses and connected to the end extension-beams 21 by hangers 64, and the life-guard as 65 pivoted near the outer ends of the bars 63, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 8th day of March, A. D. 1894.

EDGAR PECKHAM.

Witnesses:

J. E. M. BOWEN,

M. C. PINEKEY.



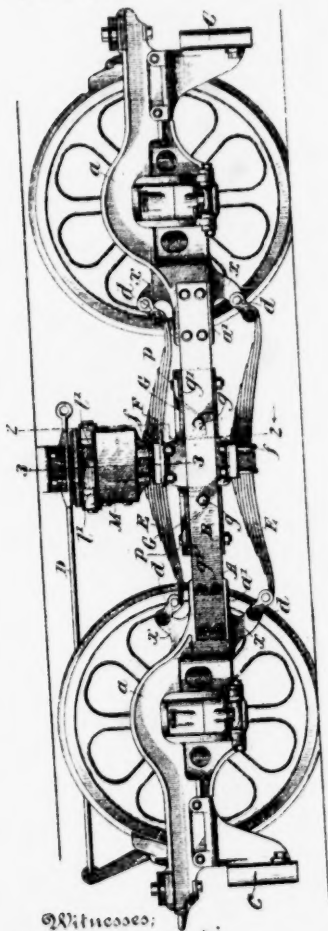
(No Model.)

W. S. G. BAKER.  
CAR TRUCK

2 Sheets—Sheet 1.

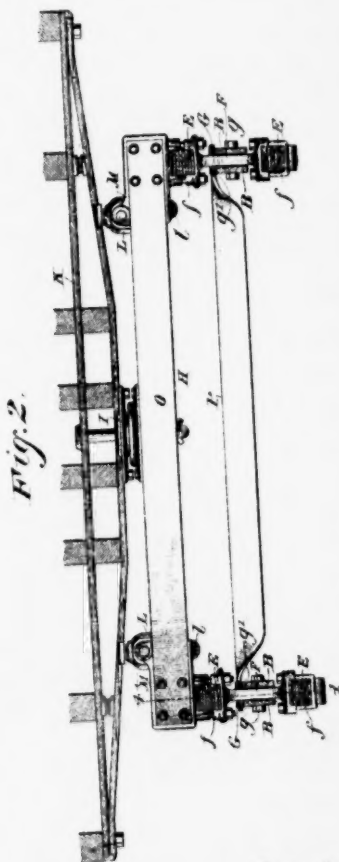
No. 553,298.

Patented Jan. 21, 1896.



Witnesses;

J. M. Thorne  
B. H. Miller.



Inventor  
*William S. G. Baker,*

By his Attorneys  
Raldson Dandson Wright.



(No Model.)

W. S. G. BAKER.  
CAR TRUCK.

2 Sheets—Sheet 2.

No. 553,298.

Patented Jan. 21, 1896.

Fig. 3.

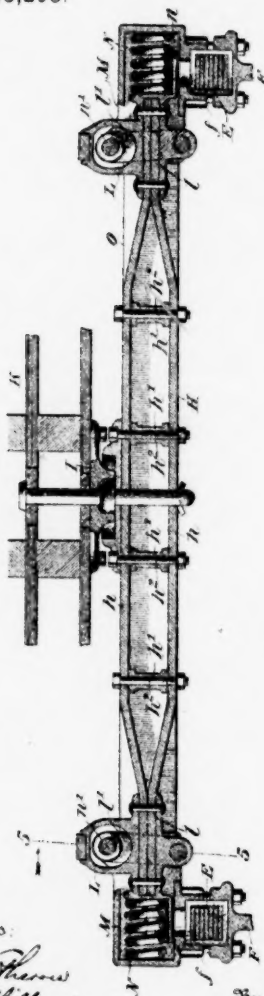


Fig. 5.

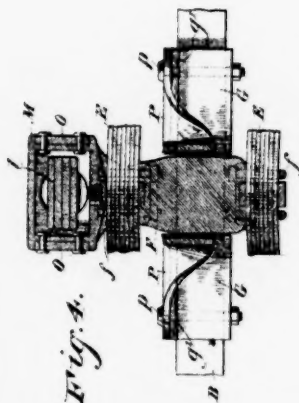


Fig. 4.

Witnesses:

*J. M. Thomas*  
*B. H. Miller*

Inventor,  
*William S. G. Baker.*

By His Attorney

*Baldwin Davidson Wright*



## UNITED STATES PATENT OFFICE.

WILLIAM S. G. BAKER, OF BALTIMORE, MARYLAND.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 553,298, dated January 21, 1896.

Application filed October 7, 1895. Serial No. 564,903. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. G. BAKER, a citizen of the United States of America, residing at Baltimore, (Fulton Junction,) in the State of Maryland, have invented certain new and useful Improvements in Car-Trucks, of which the following is a specification.

My present invention more especially relates to trucks in which a bolster is mounted on the truck-frame between the wheels and is pivotally connected at its center with the car-body. This class of trucks, commonly called "center-bearing trucks," has long been used on steam-railway cars, but is now to some extent being used on electric cars, their use being demanded owing to the fact that long car-bodies now extensively used require eight instead of four wheels in order to properly support the weight not only of the car-body but also of the motor mechanism, and in order that the wheels may follow the track when turning a short curve a pivotal connection is made between the bolster and the car-body.

The object of my invention is to improve the class of trucks above mentioned by supporting the weight of the car-body as near to the axles as possible by springs which afford ease of movement and freedom from jolting, &c.

A further object of my invention is to so arrange the bolster on the springs that a clear space for mounting the motor mechanism may be afforded, and the bolster may be allowed to swing with the car-body relatively to the truck.

In the accompanying drawings, Figure 1 shows a side elevation of a truck equipped with my improvements. Fig. 2 shows a transverse section of the truck on the line 2-2 of Fig. 1. Fig. 3 shows, on an enlarged scale, a transverse section on the line 3-3 of Fig. 1. Fig. 4 shows, on an enlarged scale, a transverse section on the line 4-4 of Fig. 2; and Fig. 5 shows a transverse section on the line 5-5 of Fig. 3.

The wheels, axles, and axle-boxes may be of any suitable construction.

The truck-frame is composed of two side frames A, similar in construction to each other and suitably cross-connected. Each side frame consists of two yokes a, one at each

end of the truck, extending over the axle-boxes and connected with each other by two wrought-metal plates B, the ends of which are seated in recesses on the opposite sides of the inwardly-projecting arms a' of the yokes a. The plates are securely bolted to the castings, as shown, and are arranged a suitable distance apart to allow a clear space for a purpose hereinafter specified.

The life-guards C are secured to the side frames in the usual way, and any suitable brake mechanism D may be employed.

Each yoke a is cast with two brackets x, one above and the other below the sockets in which the plates B are secured. To these brackets are hinged links d, which are in turn pivotally connected with the ends of semi-elliptical leaf-springs E, one above and the other below the plates B of the side frame, on each side of the truck. The springs on each side are rigidly connected together at their center by an upright plate F, by means of suitable fastening devices f. The plate F is free to move vertically between the plates B but is prevented from twisting, and endwise movement is prevented by means of blocks G, arranged at opposite ends of the plate F and secured to the plates B by bolts g. These blocks have flanges g' at their upper edges that rest on the top of the plates B.

The bolster H is connected by a center-bearing I of well-known construction to the car-body K, and the opposite ends of the bolster rest on the two upper springs E on opposite sides of the truck. I may either provide a rigid connection between the springs and the bolster, or I may provide a flexible one, to enable the bolster to swing, to provide an ease of movement, especially when passing curves. I prefer to construct and arrange the bolster, as shown in the drawings. As shown particularly in Fig. 3, the bolster is formed of upper and lower plates h, held apart by timbles h' and secured by the bolts h'. The ends of the plates at each end of the bolster are brought together and bolted or riveted in a seat i in a casting L, which is suspended by links l' from a casting M, mounted on the springs. The casting M is connected with the devices f, which secure the upright plate F to the upper spring E. It is formed with a housing within which is arranged a coiled spring N,

Here follow diagrams marked p.p. 303 & 304

resting in a holder *n* on the end of the casting *I*, and taking the end-thrust of the swinging bolster *II*. The links *l* which suspend the casting *I* are, as clearly shown in Figs. 3 and 5, pivotally connected with the bolt *n*, mounted on lugs forming part of the casting *M*. The castings *M* on opposite sides of the bolster are connected rigidly by two plates *O*, the ends of which are seated in recesses or sockets in the sides of the castings *M*, as indicated in Fig. 5. This rigid connection between the castings holds the springs in proper position while enabling the bolster to have the proper end-wise swinging movement.

By these improvements, the bolster is elevated above the plane of the axles and above the top of the side frames, thus affording a clear space for the electric motors and their supporting mechanism.

I have shown in Figs. 1 and 2 cross-bars *P*, which are designed to support the ends of the electric motors. The opposite ends of these motors may be supported, as is usual, by the axles. Each cross-bar *P* is preferably a flat twisted bar, as shown, each end being preferably secured by a vertical bolt *p* to a block *G*. This detail of construction, however, is not important. By employing two half-elliptical springs, one above and the other below the side frame of the truck on each side and connecting the ends of the springs to the side frames near the axles, I am enabled to take the strain off from the truck-frame at the center and apply it near the axles with a reduced amount of leverage. The two springs divide the weight and afford an ease of movement to the truck that it would not have if a single spring were used sufficient to support the weight.

I claim as my invention—

1. The combination with the wheels, axles, and axle boxes of the side frames, the bolster above the side frames, two semi-elliptical leaf springs on each side of the truck arranged in the same vertical plane and connected together by a vertically moving connection, flexible connections between the ends of the springs and the side frames, and connections between the bolster and the springs on the opposite sides of the truck.

2. The combination with the wheels, axles and axle boxes, of the side frames, the bolster located above the side frames, the two semi-elliptical leaf springs on each side of the truck one above and the other below the side frame, a rigid connection between said springs and

pivotal connections between the ends of the springs and the side frames near the axles.

3. The combination with the wheels, axles and axle boxes, of the side frames, each composed of yokes extending over the axle boxes and formed with the link-supporting lugs, a pair of plates having a space between them and secured at each end in sockets in the yokes, a bolster above the side frames, semi-elliptical springs rigidly connected together on each side of the truck, and pivotal connections between the ends of the springs and the link-supporting lugs.

4. The combination with the wheels, axles and axle boxes, of the side frames, each composed of yokes, and plates with a space between them as described, a pair of semi-elliptical leaf springs one above and the other below the side frame on each side of the truck, a plate extending between the plates of the side frame and adapted to move vertically therein, connections between the upper and lower ends of this plate and the semi-elliptical springs, blocks secured between the plates on opposite sides of the vertical spring-connecting plate and a bolster supported by the springs on opposite sides of the truck, substantially as described.

5. The combination with the wheels, axles and axle boxes of the side frames, the semi-elliptical springs supported on the side-frames between the wheels, the castings mounted on the springs above the plane of the side-frames and connected rigidly together, and the bolster pivotally connected with the car body and suspended from the castings by swinging links, substantially as described.

6. The combination with the wheels, axles and axle boxes, of the side frames, the semi-elliptical springs supported on the side-frames between the wheels, the castings mounted on the springs above the plane of the side frames, and connected rigidly together, as described, the bolster pivotally connected with the car body and suspended from the castings by swinging links and the springs arranged in housings of the castings and bearing against the ends of the bolster, substantially as described.

In testimony whereof I have hereunto subscribed my name.

WILLIAM S. G. BAKER.

Witnesses:

DANIEL W. POWELL.

A. E. BAKER.

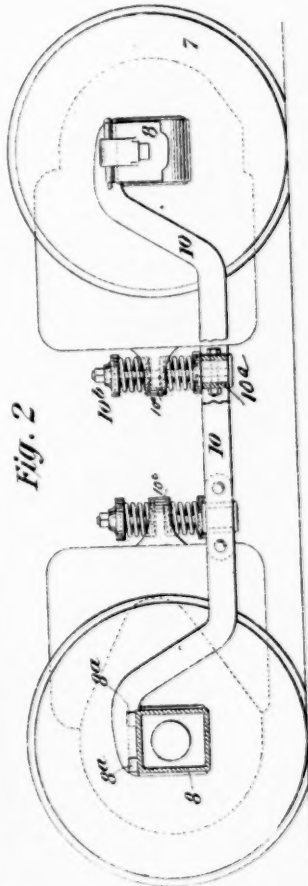
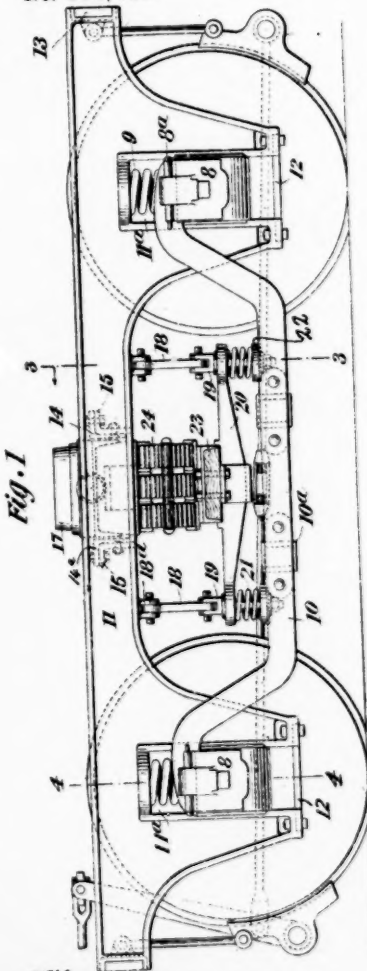
(No Model.)

2 Sheets—Sheet 1.

W. E. COOKE.  
CAR TRUCK.

No. 595,045.

Patented Dec. 7, 1897.



Witnesses:  
*Raphael Petter*  
*J. M. Brown*

Inventor  
*William E. Cooke*





(No Model.)

2 Sheets—Sheet 2.

W. E. COOKE.  
CAR TRUCK.

No. 595,045.

Patented Dec. 7, 1897.

Fig. 3

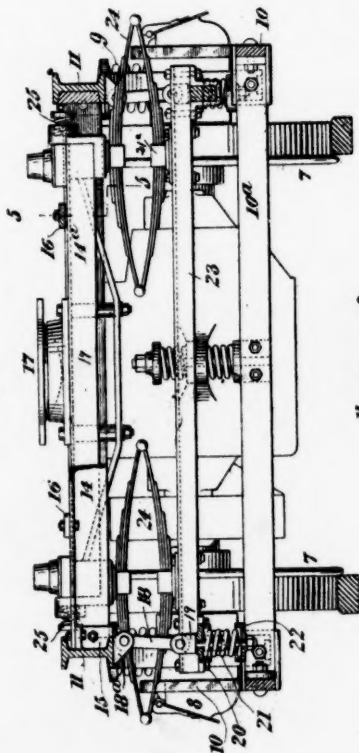


Fig. 5

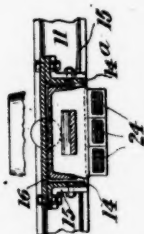
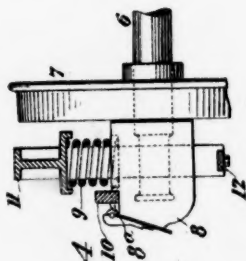


Fig. 4



Witnesses:

Raphael Ketter  
J. M. Brown

Inventor

William E. Cooke



# UNITED STATES PATENT OFFICE.

WILLIAM E. COOKE, OF KINGSTON, NEW YORK, ASSIGNOR TO THE PECKHAM MOTOR TRUCK AND WHEEL COMPANY, OF NEW YORK, N. Y.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 595,045, dated December 7, 1897.

Application filed March 2, 1897. Serial No. 625,689. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. COOKE, of Kingston, county of Ulster, and State of New York, have invented certain new and useful Improvements in Car-Trucks, of which the following is a specification.

This invention relates to the construction of trucks intended particularly for electric locomotives, but also applicable to general street-railway service.

The object of the invention is to devise a truck that shall possess great strength, durability, and efficiency and which is capable of supporting the car-body elastically upon the truck-frame independently of the support for the motor or motors, which latter are supported in part by motor-frames at the sides of the truck, suspended from the tops of the axle-boxes and being entirely independent of the truck-frame.

The invention will be fully understood from the description hereinafter given, taken in connection with the accompanying drawings, forming a part of this specification, and where- in like features of the construction are indicated by the same numerals of reference in the several views.

In the drawings, Figure 1 is a side elevation of a truck embodying my improvements. Fig. 2 is a similar view with the main frame which supports the bolster for the car-body removed, but showing the motor-supporting frame and appliances. Fig. 3 is a cross-section on the line 3 3 of Fig. 1, partly broken away. Fig. 4 is a detail sectional view on line 4 4 of Fig. 1. Fig. 5 is a detail cross-section on the line 5 5 of Fig. 3.

In the drawings, 6 designates the truck-axle, 7 the wheels, and 8 the journal-boxes, the latter provided in their top surfaces with depressions for receiving spiral springs 9, upon which the main side frames of the truck are cushioned, as explained hereinafter, and also provided with ledges 8\* to prevent the displacement of the motor-supporting frames, as shown.

The main frame of the truck consists of two castings 11, one at each side of the truck and of the configuration shown in the side view, Fig. 1, the cross-section of these frames at the top portion thereof being in the shape of

I-beams, as indicated in Figs. 3 and 4. By referring to Fig. 1 it will be seen that the frame 11 is cut out at 11\* at both ends to receive or straddle the journal-boxes, and it is also cut away at the wheel-base or between the wheels to render the motors easily accessible and at the lower outer corners to give symmetry and reduce the weight of the structure and to give as much room as possible under the beam for operating mechanism. The frame 11 will thus consist of a longitudinal beam having two downwardly-extending arms near each end; forming two yokes for spanning the respective journal-boxes, with the lower surface of the beam being substantially on a line with the bearing-surface of the yokes. In the tops of the cut-away portions 11\* there are provided pockets, as shown, which receive the spiral cushioning-springs 9, and the bottoms of such cut-away portions have bolted across the same the repair-pieces 12. At the extreme ends of the truck its side frames 11 are connected together by the usual transverse beams 13.

At the longitudinal center of the truck there are arranged the cross-beams 14 14\*, which are bolted to flanges 15, cast with or connected to the inside of the side frames 11. These beams 14 14\* are a sufficient distance apart to permit the requisite play of the swinging bolster and are connected transversely by the stay-bars 16. The bolster upon which the car-body is adapted to rest is indicated at 17 and may be of the usual construction. It is suspended from the side frames 11 of the truck by the links 18, two at each side of the truck, the same being pivoted to lugs 12\*, cast on said side frames, the said links 18 being in turn pivoted to eyebolts 19, which pass through the suspended cross-bars 20 and are provided below said cross-bars with spiral springs 21, held in place by cup-shaped washers 22 and nuts below said washers.

It will be seen that there are two of the suspended bars 20, one at each side of the truck-frame. Supported centrally on the bars 20 is the swinging bolster 23, which is secured to the bars 20 by clamps passing under said bars, which are bolted at their upper ends to said bolster. On the bolster 23 are mounted the elliptic springs 24, one at each side of the

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See Here follow diagram marked pl

truck. These elliptic springs 24 are secured to the beam 23 and also to the bottom of the car-supporting bolster 17 by the ordinary elliptic-spring fastener or socket 21<sup>a</sup>. The bolster 17 is therefore elastically supported on the elliptic springs 24, and the swinging beam 23, upon which said springs are mounted, is in turn elastically supported on the cross-bars 20, connected to the spring-equipped eyebolts 19, which are suspended directly from the truck-frame. By this construction the car-supporting bolster is flexibly and elastically supported on the truck. Spring-buffers are indicated at 25 at the ends of the bolster 17 and serve the usual function of such devices.

The motor-sustaining frames 10, which support the weight of the motors, are of the configuration shown in the drawings, the same being depressed centrally between the wheel-base of the truck, with their outer elevated ends adapted to seat on top of the journal-boxes 8, as clearly shown in the drawings. These motor-supporting frames 10 in the position which they occupy are outside of the truck-frame 11, and they are wholly independent of the truck-frame. They support the cross-beams 10<sup>a</sup>, upon which are mounted the spring-equipped standards 10<sup>b</sup>, to which the outer end of the motor is connected by means of a ring or sleeve 10<sup>c</sup> on the motor, encircling said standard, with a spring above and below the ring or sleeve. The motor is thus elastically suspended from the cross-beam 10<sup>a</sup>. The support for the motors is by this construction wholly independent of any connection with the side frames of the truck, which carry the car-body and its load, or with the means whereby the car-body is supported on the truck.

The side frames 11 are preferably made in one piece, as shown. They afford to the truck structure great strength and durability. It will be understood from an inspection of Figs. 1 and 2 of the drawings that by removing the bolts connecting the repair-pieces 12 to the side frames 11 at the bottoms of the journal-boxes the said frames 11 may be readily removed, together with the bolster and its suspending appliances.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car-truck the combination with the side frames, of links pivoted to said frames, eyebolts to which the links are pivoted, bars through which the eyebolts extend, springs on the eyebolts below said bars whereby the

bars are elastically supported, a cross-beam supported by said bars, one or more springs thereon, and a car-supporting bolster supported by the springs.

2. In a car-truck the combination with the side frames, of links pivoted to said frames, eyebolts to which the links are pivoted, bars through which the eyebolts extend, spiral springs 31 on the eyebolts below said bars, cup-shaped washers against which the spiral springs press, and a car-supporting bolster suitably supported on said beams.

3. The combination with the truck-frame and the journal-boxes, of motor-frames arranged outside the truck-frame and supported on the journal-boxes wholly independent of the truck-frame.

4. The combination with the truck-frame and the journal-boxes, of a pair of motor-frames arranged at the respective sides of the truck-frame and having depressed central portions at the wheel-base, and elevated end portions adapted to rest on the tops of the journal-boxes outside of the truck-frame and appliances supported by said motor-frames for sustaining the motor independently of any connection with the truck-frame.

5. In a car-truck, the combination with the journal-boxes and the truck-frame, of a motor-sustaining frame at each side of the truck, supported at each end on the journal-boxes and having a depressed portion between said ends, a cross-beam 10<sup>a</sup> connecting the two motor-frames and supported thereby, spring-equipped standards mounted on said cross-beam, and adapted to sustain the motor independently of any connection with the truck-frame.

6. In a car-truck, the combination with side frames provided with openings near their ends to receive or straddle the journal-boxes, and springs arranged between the tops of said openings and the journal-boxes, whereby said frames are cushioned on the journal-boxes, of a car-body-supporting bolster elastically suspended from the side frames, and independent motor-sustaining frames supported at their ends on the journal-boxes outside of the main frames of the truck and depressed at the wheel-base of the truck, and elastic appliances supported by said motor-frames to sustain the weight of the motor.

Signed at New York, N. Y., this 19th day of February, 1897.

WILLIAM E. COOKE.

Witnesses:

E. PECKHAM,  
CHAR. S. ACKLEY.

No. 610,118.

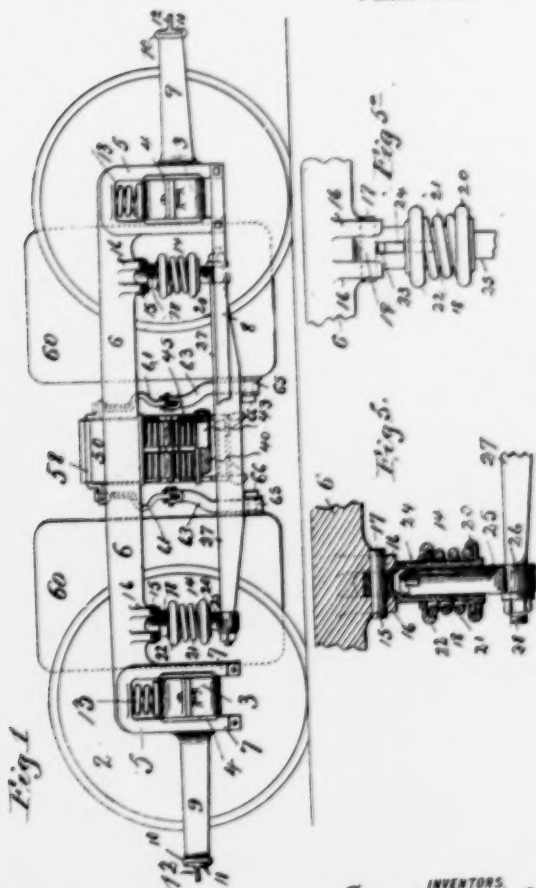
Patented Aug. 30, 1898.

G. M. BRILL & S. M. CURWEN.  
PIVOTAL TRUCK.

(Application filed Nov. 9, 1896.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:  
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*Manufacturer*

INVENTORS.  
*George M. Brill and*  
*Samuel M. Curwen.*  
 BY *Joseph A. Levy*  
 ATTORNEY



No. 610,118.

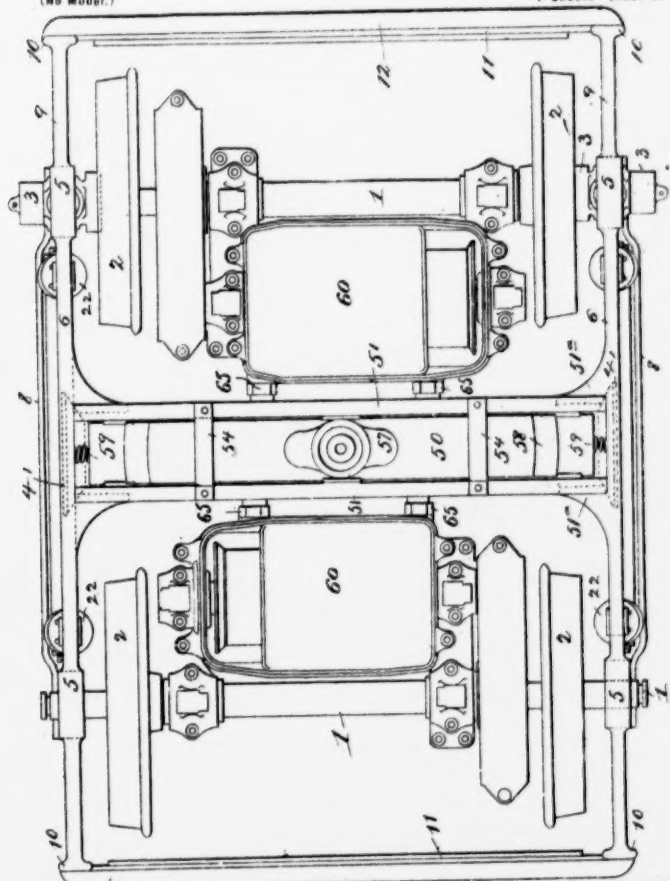
Patented Aug. 30, 1898.

G. M. BRILL & S. M. CURWEN.  
PIVOTAL TRUCK.

(Application filed Nov. 3, 1896.)

(No Model.)

4 Sheets—Sheet 2:



WITNESSES:

*Herbert F. Rusk*  
*Witness*

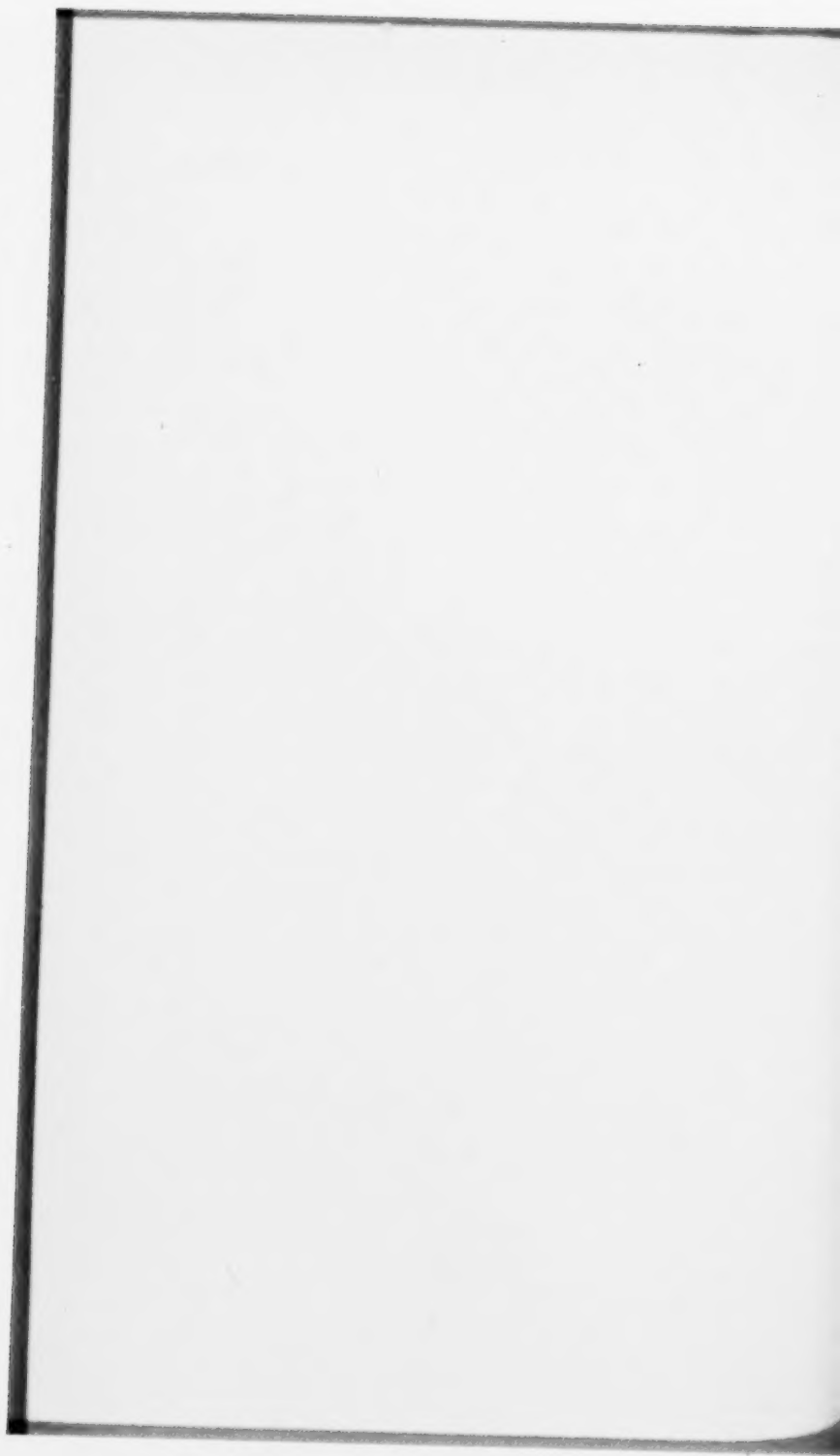
Fig. 2.

INVENTORS.

*George M. Brill and*  
*Samuel M. Curwen*

BY

*Joseph L. Day*  
 ATTORNEY





No. 610,118.

Patented Aug. 30, 1898.

G. M. BRILL &amp; S. M. CURWEN.

PIVOTAL TRUCK.

(Application filed Nov. 2, 1896.)

(No Model.)

4 Sheets—Sheet 3.

Fig 3

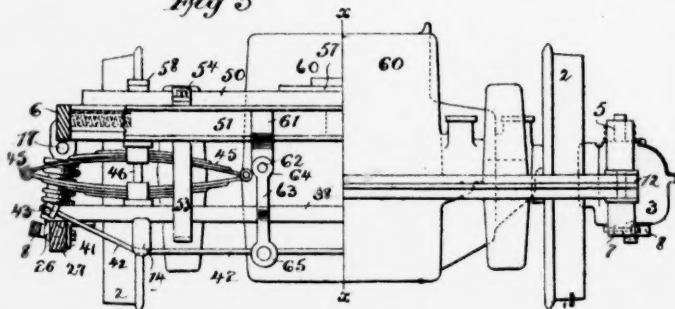
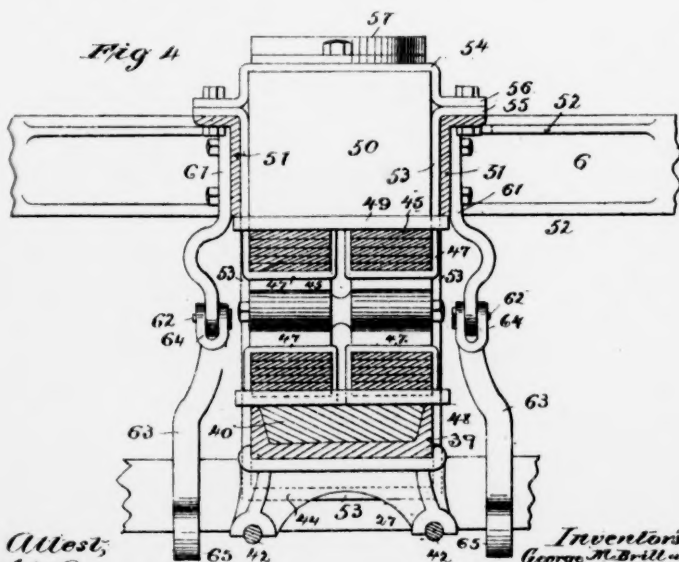


Fig 4



Attest,  
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By Joseph L. Levy  
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No. 610,118.

Patented Aug. 30, 1898.

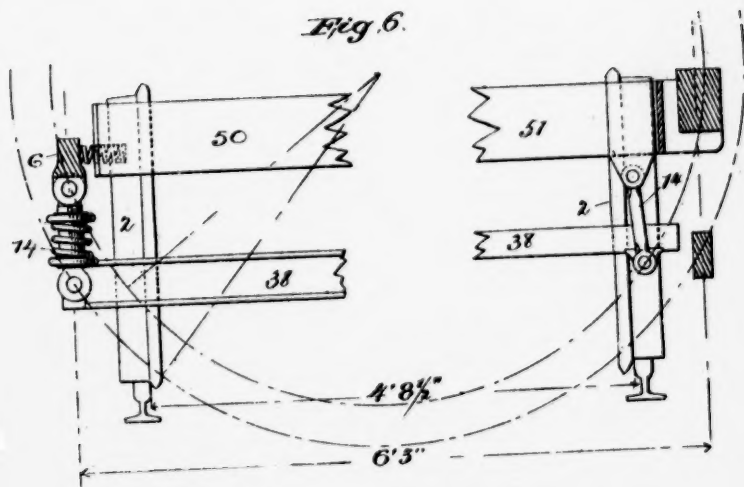
G. M. BRILL & S. M. CURWEN.  
PIVOTAL TRUCK.

(Application filed Nov. 3, 1896.)

4 Sheets—Sheet 4.

(No Model.)

Fig. 6.



Attest,  
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George M. Brill and  
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By Joseph L. Levy  
attorney.



# UNITED STATES PATENT OFFICE.

GEORGE MARTIN BRILL AND SAMUEL M. CURWEN, OF PHILADELPHIA  
PENNSYLVANIA, ASSIGNORS TO JOHN A. BRILL, OF SAME PLACE.

## PIVOTAL TRUCK.

SPECIFICATION forming part of Letters Patent No. 610,115, dated August 30, 1898.

Application filed November 3, 1896. Serial No. 610,902. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE MARTIN BRILL and SAMUEL M. CURWEN, citizens of the United States, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, have made certain new and useful Improvements in Pivotal Trucks, of which the following is a specification.

Our invention relates to improvements in the construction of pivotal car-trucks, and especially to that class of pivotal trucks which are adapted for use on passenger-cars wherein an electric motor or other like agency is employed for the propulsion of the same.

The primary object of our present invention is to produce an easy-riding truck wherein the movements of the truck caused by unevenness or other derangement of the road-bed, as well as the ordinary evolutions of the truck, are, so far as their effect upon the car-body is concerned, reduced to a minimum, and one of the agencies employed in our present construction whereby this result is achieved to a marked extent is what we term the "extension" of the bolster-spring base.

It has been usual to hang the bolster construction, and primarily the "spring" or "sand" plank, as it is ordinarily termed, from the transoms, which are disposed across the truck between the side frames, the ends of the transoms being secured to the side frames, the support for the bolster being from the transoms at points within the side frames and mainly within the wheel-gage. In those cases the support or base for the bolster was considerably shorter than the wheel-gage and according to our experience aided rather than decreased and in some cases considerably amplified the movements of the truck which are communicated to the car-body. According to our present improvements in this regard we preferably dispense entirely with this "between-gage" suspension for the bolster (although in some cases it may be desirable to otherwise dispose the suspension) and employ what we call "equalizing-bars," suspended directly from the side frames of the truck outside of the wheels, and secure the spring-plank solidly or fixedly to the mediate portions of the equalizing-bars on both sides, thereby materially increasing the span or base

of the spring-support for the bolster, enabling it to resist transverse oscillation to a greater extent than under the old method of swinging the bolster. In addition to this we have carried the physical connection of the equalizing-bars with the side frames close to the axles, which relieves the side frames from a large part of the strain which comes upon them when the load is carried by the transoms, and suspended the ends of the equalizing-bars from the side bars of the truck-frame, thereby vastly increasing the longitudinal base or support of the bolster, and in order to permit of the transverse swing of the bolster and also to resiliently connect the equalizing-bars with the truck-frame, which latter is in turn resiliently supported upon the car-axle, we connect the ends of the equalizing-bars to the truck-frame by swing-links, which are each so constructed that they are separable or extensible and the separation of the parts resisted by a spring of the "draw-and-recoil" class having a double and opposite action, (or a single-acting spring or springs may be employed,) the result of which is that the bolster, or, in other words, the "spring" or "sand" plank, as it is termed, is resiliently supported from the side bars of the truck-frame, the spring-links for so supporting the spring-plank with the springs between the axle-boxes and side frames and the full elliptics (or others on the spring-plank which are interposed between the latter member and the bolster proper) forming three sets of springs arranged in series to carry the load, all of which, as will be hereinafter described, enter into the modification of the truck motions and that of the supported car.

Our invention also includes improvements in the general construction of the truck, also means for supporting the motor upon the truck, and, further, the general construction and combination of parts hereinafter described, and further pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a truck embodying our improvements and electric motors, diagrammatically illustrated, mounted thereon, part of the truck being broken away. Fig. 2 is a plan view of Fig. 1. Fig. 3 is an end elevation of the truck, one half

See Here follow diagram marked p. p 311, 312, 313, 314

of which is cut away to illustrate the bolster construction, said latter half being partly in section. Fig. 4 is an enlarged longitudinal sectional elevation through the bolster, showing a portion of the equalizing-bar and top chord of the side frame on one side of the truck and also the motor suspension. Fig. 5 is an enlarged sectional elevation of the suspending-link for the equalizing-bars, a portion of the end of one of the equalizing-bars, and a portion of the top chord of the side frame. Fig. 5<sup>a</sup> is a side elevation of the same. Fig. 6 is a transverse sectional elevation of a car-truck, the left-hand side illustrating the construction disclosed in this application and the right-hand side that of the usual swing-bolster truck, said view being illustrative of the arcs of vibration of the bolster in the old style of truck and in the present construction.

Similar numerals of reference indicate corresponding parts throughout the several views.

1 in the drawings are the axles, and 2 the truck-wheels; 3, the journal-boxes, provided with vertical restraining-ribs 4.

The truck-frame is of the class known as an "axle-box" frame—that is, it is supported by and maintains the axle-boxes in parallelism—said frame comprising, as to both sides of the truck, the side frame having inverted-U-shaped yokes or pedestals 5, embracing the axle-boxes between the ribs 4, the yokes being connected together at the top by the top chord or side bar 6, the outside of the lower portion of the arms 7 of the yokes being recessed to receive the pedestal tie-bar 8, to which the yoke arms are bolted, the tie-bar constituting a lower chord for the side frame and which is bent outwardly to give clearance for the swing of the equalizing-bars hereinafter described. From the outer arms of the yokes, preferably on the same horizontal plane approximately with the axles, are outwardly-extending arms 9, formed with recessed jaws 10, in which is seated the bottom plate 11 of a T-iron cross-bar 12, the end cross-bar tying the side frames together transversely.

The foregoing comprises the truck-frame, which may be variously termed an "axle-box frame" or "truck-frame," and the top chord may be termed the "side bar," and the top chord, yokes, and extensions the "side frame."

The first (the last in point of operation when the motion is derived initially from the car-body) of the series of springs for supporting the car-body consists of the springs 13, interposed between the tops of the yokes 5 and the tops of the axle-boxes 3, seats being provided on both parts to receive the same. These springs are not the usual cushions ordinarily placed between the axle-boxes and yokes to deaden the movement between these parts and which had or have little, if any, elasticity and gave but very little, if any, re-

sistent support to the car, but spiral springs intended to enter into and form part of the spring-support of the car in the manner hereinafter described, at the same time acting as cushions between the parts.

Closely adjacent the axle-box yokes and from the top chord 6 are pivotally suspended the spring-links 14. (See Figs. 5 and 5<sup>a</sup>.) The top chord 6 is provided with a bifurcated lug 15, formed by the ears 16, depending from the under surface of the chord and extending up the side of the chord for strengthening purposes, the lugs being preferably made integral with the top chord, or they may be made separate and fastened to said chord. The ears are provided with holes, through which extends a stout pin 17, and from the pin is suspended the links, in this case comprising the spring-seat hanger or barrel 18, by means of a circular top or head 19, entering in between the ears of the bifurcated lug through which the pin 17 extends, pivotally supporting the hanger from the top chord, the lower portion of the hanger being barrel-shaped, from the bottom of which extends outwardly a circular spring-seat 20, the barrel portion of the hanger being of greater diameter than the head in order to firmly unite the parts together and prevent derangement. The spring-seat supports a spiral equalizing-spring 21, (preferably of greater carrying capacity than the springs 13, or, if desired, than the bolster-springs,) which encircles the barrel of the hanger, which spring forms another of the series of car-springs, and on top of said spring and encircling the barrel 18 rests a movable spring cap or follower 22. The sides of the barrel of the hanger are provided with slots 23, (best seen in Fig. 5<sup>a</sup>), through which extends a heavy bar or pin 24, which passes through the top of a thrust-bar 25, which pin rests upon the top of the follower 22, the thrust-bar moving within the barrel of the hanger. The lower part of the thrust-bar is provided with an apertured enlargement or eye 26, through which extends the end of the equalizing-bar 27, the end being shouldered to form a journal 28, which is provided with a set-nut and washer to confine the thrust-bar and equalizing-bar together.

If it is desired to employ a non-swinging bolster, the ends of the equalizing-bar can be made fast to the thrust-bar, so as not to allow of rotation within the apertured enlargement of the thrust-bar; but we prefer to make allowance for relative movement between these parts.

As shown, the equalizing-bar is strengthened by increasing its thickness centrally.

By reference to Figs. 2 and 3 it will be seen that the spring-links are given an outward inclination from their point of support on the side frames. This increases the stability of the swinging parts comprising the equalizing-bars and bolster construction, the tendency of the inclination being to bring the parts back centrally to a state of rest.

To the central portion of the equalizing-bar is secured a spring-plank, upon which rests the full-elliptic or other bolster springs, and on them rests the bolster for supporting the car-body, all in the manner hereinafter described.

At 38 is illustrated the spring-plank, which is formed by the channel-beam 39, with its flanged edges turned up, and the wooden filling 40, Fig. 4, let into the channel of the beam 39, the flanged edges protecting the sides of the filling, thus forming a light, strong, and economical structure, the ends of the channel-beam resting on the top of the equalizing-bars, as shown in Fig. 3, and this union is further reinforced by the angle-pieces 41, which may be either formed integral with the equalizing-bar or bolted thereto, to which the channel-beam is bolted, thus securing both of the equalizing-bars together transversely.

In order to strengthen the land-plank, two parallel truss-bars 42 are employed, secured at each end to a plate 43, Fig. 3, abutting against the end of the spring-plank, the truss-bars being held away from the spring-plank by spreaders 44, which bear against said bars and which are located directly under the elliptic bolster-springs 45, giving said springs an additional support and strengthening the spring-plank, the ends of the truss-rods being inclined upwardly to meet the end of the spring-plank, as shown in Fig. 3.

Upon the filling 40 of the spring-plank and in line with the flange 46 of the wheels 2 are secured in pairs the transversely-extending full-elliptic bolster-springs 45, their central straps 47 being seated in blocks 48, either resting upon or secured to the spring-plank, the upper straps of the springs being seated in blocks 49, which rest against the bolster 50, of wood, &c., to which said blocks may be secured.

The bolster-springs 45, which may be of any desired form or otherwise arranged, preferably that shown, form the third of the series of car-supporting springs.

At 51 are transoms, of angle iron, which extend between the top chords 6 of the side bars, the inner sides of the chords being provided with bracket-like lugs or projections 51', with reinforcing-webs 52, (clearly seen in Figs. 2 and 4), to which the ends of the transoms are secured, as shown in Fig. 4, which lugs can either be bolted on or preferably cast integral with the top chord.

A safety-strapping composed of the parts 53 54, their ends 55 56 being secured to the top flange of the transoms, surrounds the spring-plank and the elliptical springs and the bolster to hold the parts together in case they become accidentally disengaged.

By means of construction heretofore described the strains upon the truck-frame for a given weight of car and load are much less than in the ordinary construction. The swing-links come close to the pedestals or

axle-box yokes, relieving the side bars of a large part of the strain which comes upon them when the load is carried by the transoms. Other things being equal, therefore, the truck may be kept square with less strain on the frame.

Reference is had to Fig. 6, which diagrammatically illustrates the motions of the bolster in the old and present types. In both cases the center plate is taken as the center of motion and support, the circles representing the lines of motion. With the old style of link suspension from the transoms, as at the right hand of the figure, the radius of motion is that of the inner circle. The radius for the outer circle is obtained by placing the hangers outside of the wheel-gage, as shown at the left hand, the motion of course being slower in proportion with the greater radius and correspondingly easier. This novel feature of the truck and result is obtained through the employment of the link-hung equalizers. These, as before described, are straight forged bars carried by swing-links or stirrups upon their ends from the side bars. At the centers they are solidly connected with the spring-plank. The equalizers, spring-plank, and bolster move together in the side motion. This construction and disposition enable it to perform all that is possible of an equalizer arranged in the old way on the boxes, for the ordinary equalizing-bar is so in name only. It slightly reduces the motions of the wheels. In rare cases the movement of the body may be as small as three-quarters that of the journal; but this is all that can be expected. With our equalizer all is accomplished that an equalizer can do theoretically, which is twice that of the ordinary form. This makes the motion of the car-body one-half as great as that of the wheel.

The spring-links are a novel feature of construction. They differ from the ordinary link in position, action, and in the possession of elasticity and the capability of longitudinal separation. While they perform all the functions of the common swing-links, they also cushion the side motion. They are so placed that the motion of the journal is doubly cushioned before it reaches the equalizer itself.

As will be noticed, the springs are almost in vertical alignment with the journalled ends of the equalizing-bars.

There are three sets of springs in the truck. To use an electrical term, they are placed in a "series." The weight rests on each set. There are the journal-springs resting on the tops of the boxes. They cushion the rapid motion of the truck-frame before it reaches the equalizer, making this motion much more safe than in the usual form. Next above this in the order of load-carrying come the springs in the links, and finally the elliptics. The load rests, primarily, on the interior elliptics, or whatever kind of springs are used in that position. It is then transmitted to the springs in the links and from them to the journal-

springs. This gives a very great degree of elasticity to the truck and enables it to adjust itself with a minimum amount of disturbance to the inequalities of the track. The equalizers have also the effect of distributing the load equally on the two wheels on each side of the truck no matter what the vertical position of any of the wheels may be.

Owing to the fact that the load primarily rests on the equalizers and by them is transmitted to the side frames at points close to the pedestals, the side frames are subjected to less strains than they would be if the load rested on them midway between the wheels. The result of the lateral and vertical adjustability of the trucks is that it has great adherence to the track.

The truck-brakes may be hung on the cross-bars 12, and through the features of construction before described the lifting and thumping and other disagreeable results of the application of the brakes are greatly reduced or entirely done away with.

The bolster carries the usual center bearing 57 and side bearings 58, and between the ends of the bolster and the insides of the side bars extend spiral springs 59 for easing up the lateral swing of the bolster.

At 60 is an electric motor diagrammatically illustrated, one end being hung from the axle in the usual or desired way, the other or free end being supported from the transoms.

We have illustrated a form of side bar and transom-support for the free end of the motor in Figs. 1, 3, and 4, in which a hanger 61 is secured to the transom 51, and the end of the hanger is provided with a pin 62, from which depends a laterally-swinging link 63, secured to the pin by the apertured eye 64 at the upper portion of the link, the lower portion of the link being provided with an apertured eye 65, which receives a lug 66 on the lower portion of the motor or its casing, thus pivotally uniting the links 63 to the hanger 61 and lug 66, forming an articulated and transversely-swinging support for the free end of the motor, allowing the motor to move synchronously with the thrust of the axle, the truck-spring system resiliently opposing the oscillations or torque of the motor.

As illustrated in Fig. 4, the hangers are turned outwardly in order to clear the bolster-springs. This form of suspension equalizes the space between the bolster and the axles to be utilized for the suspension of the motor, bringing the motor and its casing close up to the bolster, the essential feature of the suspension being its connection with the transoms, which derive their support from the side beams of the truck, which in turn are resiliently supported upon the axle-boxes, so that the motor has a resilient support upon the axles through the axle-box springs 13.

We do not intend to limit ourselves to the construction of truck and parts hereinbefore described and illustrated, as it is apparent that many of the parts and their particular

combinations can be embodied in other constructions to bring about the same results without departing from the spirit of our invention, especially the form of spring-link shown in our application, Serial No. 641,868, filed June 23, 1897, which is a division of this case, can be substituted for the form of link herein shown and described.

In employing the word "bolster" in the claims we do not intend to limit ourselves to a construction, as illustrated, wherein a spring-plank, bolster-springs, and bolster are employed, as it is apparent that it is not essential to some of the features of improvement herein described that the center and side bearings should be spring-supported on the spring-plank, as the bolster parts could be located directly on the spring-plank or any other means which may be employed for tying the equalizing-bars together.

Having described our invention, we claim—

1. The combination in a car-truck and its running-gear, of the side frames supported outside of the wheel-gage, the truck-bolster, and separable spring-links and equalizing-bars supporting said bolster directly from the side frames, substantially as described.

2. The combination in a car-truck and its running-gear, of the side frames supported outside of the wheel-gage, the truck-bolster, the bolster being supported from the side frames by equalizing-bars and extensible spring swinging links outside of the wheel-gage, substantially as described.

3. In a truck, the combination with the truck-frame, of a bolster, the transversely-swinging resilient suspending-links secured to the truck-frame adjacent the axle-boxes, the inflexible equalizing-bars secured to said links, the bolster being supported on said bars, substantially as described.

4. In a car-truck, the combination with the side frames, of transversely-swinging links pendent from the side frames adjacent the axle-boxes, longitudinal inflexible connections between the links, and a bolster supported upon said connections, substantially as described.

5. The combination with a car-truck, of the side frames, extensible swing-links having load-supporting springs ranged in the direction of the length of the truck and pendent from the side frames, a bolster, and equalizing-bars extending between said links and supporting the bolster, substantially as described.

6. In a car-truck, the combination with the side frames, a bolster, the spring-plank, springs intermediate of the spring-plank and bolster, the spring-plank being connected to the side frames by intermediate swing-links, and a spring on each of said links sustaining the spring-plank, substantially as described.

7. The combination in a car-truck of the side frames, spring-links depending from the side frames, longitudinal equalizing-bars connecting the links below the side frames, and



means for connecting said bars with a car-body, substantially as described.

8. The combination in a car-truck, of the side frames, transversely-swinging spring-links depending from the side frames, longitudinally-disposed transversely-movable equalizing-bars connecting the links beneath the side frames, and means for connecting said bars with a car-body, substantially as described.

9. The combination in a car-truck, of the side frames, with extensible spring swinging links depending from the side frames, an equalizing-bar connecting the links, and a bolster supported on said equalizing-bars, substantially as described.

10. The combination in a car-truck, of the side frames, swing-links supported from the side frames, each of said links being yieldable in the direction of its length, equalizing-bars connecting said links, and a bolster supported on said equalizing-bars, substantially as described.

11. The combination with a car-truck, of the side frames, pendent extensible links on the side frames, springs on the links, the equalizing-bars movably connected to the links, and a bolster supported on said equalizing-bars, substantially as described.

12. The combination in a car-truck, of the side frames, the equalizing-bars movably and resiliently suspended from the side frames, and a bolster supported on said equalizing-bars, substantially as described.

13. In a truck, the combination with the side frames, having axle-box pedestals, the longitudinally-disposed transversely-swinging equalizing-bars, pendent extensible resilient connections between the ends of the equalizing-bars and the side frames adjacent said pedestals, and a bolster supported on said equalizing-bars, substantially as described.

14. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper longitudinal chord, and a lower parallel and swinging member, the lower member being movably suspended from the upper chord, springs included in said suspension, and a bolster supported on said lower member, substantially as described.

15. The combination of a car-truck, of the side frames, the equalizing-bars, a cross-bolster secured to the equalizing-bars, links suspended from the side bars and attached to said equalizing-bars, and springs carried by said links adapted to oppose the motion of the side frames or equalizing-bars, substantially as described.

16. In a car-truck, the combination with the side frames, the links suspended from the side frames, each link carrying a double-acting spring, equalizing-bars secured to said links, and a bolster supported on the equalizing-bars, substantially as described.

17. The combination in a car-truck, of the side frames having axle-box pedestals, springs

interposed between the axle-boxes and the axle-box pedestals, separate springs hung from the side frames adjacent said pedestals, connections between said springs on each side frame, a spring-plank connecting said connections, springs on the spring-plank, and a bolster on said latter springs, substantially as described.

18. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, a further set of springs supported from the side frames, equalizing-bars supported by said further springs, a spring-plank supported by said equalizing-bars, other springs on said spring-plank, and a bolster on said latter springs, substantially as described.

19. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, links with interposed springs, said links being supported from the side frames, equalizing-bars connecting the links, a spring-plank connecting said bars, bolster-springs on said spring-plank, and a bolster on said latter springs, substantially as described.

20. The combination in a car-truck, of the side frames having axle-box pedestals, springs interposed between the axle-boxes and said pedestals, links with interposed springs, said links being supported from the side frames, and a further set of springs for supporting the car-body supported by said link-interposed springs, substantially as described.

21. In a car-truck, the combination with the side frames having the axle-box pedestals, springs interposed between said pedestals and the axle-boxes, another set of springs, two for each side frame, hung to depend from the side frames adjacent said pedestals, the spring-plank supported by said last-mentioned springs, bolster-springs on said spring-plank, and a bolster on said bolster-springs, substantially as described.

22. In a car-truck, the combination with the side frames having the axle-box pedestals, springs interposed between said pedestals and the axle-boxes, links with interposed springs, said links being supported from the side beams adjacent the pedestals, and a further set of car-upholding springs supported by said link-interposed springs, substantially as described.

23. In a car-truck, the combination with the side frames having the axle-box pedestals, springs interposed between said pedestals and the axle-boxes, links with interposed springs, said links being supported from the side frames at or near the pedestals, the spring-plank supported by said link-interposed springs, bolster-springs on the spring-plank, and a bolster on said bolster-springs, substantially as described.

24. The combination in a car-truck, of the side frames having axle-box pedestals, spiral springs interposed between the axle-boxes and

said pedestals, and a further set of spiral springs of greater carrying capacity supported from the side bars, a spring-plank connected with said last-mentioned springs, elliptic springs on said spring-plank, and a bolster supported on said elliptics, substantially as described.

25. In a car-truck, the combination with the side frames having axle-box pedestals, springs interposed between the axle-box pedestals, a further set of springs supported from said side frames, equalizing-bars suspended by said latter springs, a spring-plank transversely connecting said equalizing-bars, springs on said spring-plank, and a bolster on said last-mentioned springs, substantially as described.

26. The combination in a car-truck, of the side frames, the pendent swing-links, springs supported on the links, equalizing-bars suspended by said springs, and a bolster supported on said equalizing-bars, substantially as described.

27. The combination in a car-truck, of the side frames, extensible links each with an interposed spring hung on the side frames, equalizing-bars suspended by said springs, and a bolster supported on said equalizing-bars, substantially as described.

28. The combination in a car-truck, of the side frames, extensible links each with an interposed spring hung to swing transversely from the side frames, equalizing-bars movably connecting the links on each of the side frames, and a bolster supported on said equalizing-bars, substantially as described.

29. The combination in a car-truck, of the side frames, extensible links with interposed springs hung from the side frames to swing transversely thereof, the inflexible equalizing-bars pivotally connected at the ends to said links, and a bolster supported on the equalizing-bars, the bolster, bars, and links being adapted to swing transversely of the side frames, substantially as described.

30. The combination in a car-truck, of the side frame, a hanger pivotally suspended from said frame, a bolt movable in said hanger, a follower on the bolt, a spring interposed between the hanger and follower, equalizing-bars secured at their ends to the bolt exterior to the hanger, and a bolster secured to said equalizing-bars, substantially as described.

31. In a car-truck, the combination of the side frames having pin-joint lugs, a pin passing through said lugs, a barrel suspended by said pin, a spring-seat on said barrel, a spring on the seat, an eyebolt having an eye at one end exterior to the barrel and a follower on the other end resting on said spring, an equalizing-bar connected at its ends to said bolts, and a bolster on said equalizing-bar, substantially as described.

32. In a car-truck, the combination with the side frames, the barrels pivotally supported from the side frames, spring-seats formed at the lower portions of said barrels, a spring on each of said seats, the equalizing-bars, bolts

on the ends of the equalizing-bars extending into said barrels, and connections between said bolts and the springs on the barrels, substantially as described.

33. The combination with the side frames, having the top chords, the lugs on the chords, the barrels suspended by the lugs having the apertures at one end and exterior spring-seats on the lower end, a pin passing through said lugs, springs on said spring-seats, the equalizing-bars and connected bolster, the bolts extending from the ends of the equalizing-bars into said barrels, a movable cap on said springs, and a bar passing from said bolts through said barrel and engaging said cap, substantially as described.

34. The combination in a car-truck, of the side frames, the bolster, the equalizing-bars, the eyebolts movably secured to the ends of the equalizing-bars, barrels movably suspended from the side frames, said bolts having followers guided by the barrels, and springs interposed between said followers and said barrels, substantially as described.

35. The combination in a car-truck, of the side frames, a spring-plank, means for suspending the spring-plank from the side frames, a spring on the spring-plank, a trans-rod extending between the ends of the spring-plank and lying beneath it, and a spreader interposed between said trans-rod or rods and the said plank, substantially as described.

36. The combination in a car-truck, of the side frames, a spring-plank, springs on the plank, means for suspending the plank from the side frames, paired trans-rod extending between the ends of the spring-plank, and spreaders interposed between the plank and said rods beneath the springs, said spreaders having lips engaging the plank, and recessed legs to receive the rods, substantially as described.

37. The combination in a truck-frame, of the side bars, transoms extending between the side bars, a spring-plank and bolster, springs between said plank and bolster, and a safety-strapping consisting of a strap encircling said plank, springs, and bolster secured to the top of each of said transoms, substantially as described.

38. The combination with a car-truck, of the inwardly-extending brackets 51<sup>a</sup> formed on the inside of the top chords 6, having longitudinal strengthening-webs 52, and transoms of angle-iron extending between said top chords, said angle-irons each having a longitudinal web resting on the top of the webs 52, and vertical webs secured to the brackets 51<sup>a</sup>, substantially as described.

39. The combination with the side bars, of the equalizing-bars rigid throughout their length, resilient links for suspending the equalizing-bars from the side bars, and a spring-plank secured to the equalizing-bars, substantially as described.

40. The combination in a car-truck, of the side bars, depending links, the equalizing-

bars on the links, a spring-plank secured to said equalizing-bars, and a truss rod or rods extending between the ends of said plank, substantially as described.

41. The combination in a truck, of the side bars of the truck-frame, transoms extending between said bars, a bolster movably supported between the transoms, a motor secured at one end upon one of the truck-axles, a hanger attached to the transom, a link pivotally secured to the hanger and depending therefrom, an aperture formed in the end of the hanger, a circular lug projecting from the free end of the motor passing through said aperture, and means for securing said hanger to said lug below the transom, substantially as described.

42. The combination in a car-truck, of the top chords of the truck-frame, a transom extending between said chords, a motor supported at one end upon one of the truck-axles, a pendent hanger or hangers secured to said transom, a pendent swing-link secured to said hanger or hangers, said link having an apertured eye at the end, and a circular lug on the free end of the motor engaging said eye, substantially as described.

43. The combination in a truck, of the motor secured on an axle thereof, the side frames, the transverse connections between the frames, the hangers G1 pendent from said connections and ranged in line with each other, links G3 suspended from the hangers by pins G2, the transversely-disposed apertured eyes G5 on the ends of the links, and rounded lugs G6 extending from the motor into said eyes, substantially as described.

44. In a car-truck, the combination with the side bars comprising the axle-box pedestals or yokes, a bar connecting said yokes, lugs depending from said bar, links depending from said lugs, the inflexible equalizing-bars connecting the links, and a bolster supported by said equalizing-bar, substantially as described.

45. A car-truck having links comprising a plurality of parts movable to or from each other in the direction of their length, a spring for opposing such movement, equalizing-bars pivotally secured at their ends to said links, a plank on said bars, springs on said plank, and a bolster on said latter springs, substantially as described.

46. A car-truck having a bolster and links extendible in the direction of their length and having interposed springs, equalizing-bars pivotally secured at their ends to an extensible element of said links, a plank on said bars, springs on said plank, and a bolster on said latter springs, substantially as described.

47. A two-part link, the parts being separable in the direction of their length, an interposed spring opposing such separation, and pivoting-eyes formed on the opposing ends of the said parts, combined with a truck-frame, equalizing-bars, and a bolster on said bars, the upper eye being pivotally attached to said

frame, the lower eye being pivotally attached to said bars, substantially as described.

48. The combination with the side bars, the apertured barrel 18 having a spring-seat 20 at the lower exterior end thereof, means for suspending the barrel from the side bars, a spring on said seat exterior to the barrel, the cap 22 exterior to the barrel and on said spring, a bolt movable in said barrel, an equalizing-bar secured to said bolt and means for connecting the bolt and the cap 22, substantially as described.

49. The combination with the side bar, of the apertured barrel 18 pivoted thereto, a spring-seat 20 at the lower exterior end of the barrel, a spring on the seat exterior to the barrel, a cap 22 exterior to the barrel and on the spring, a bolt movable in the barrel and means for connecting it with the cap 22, and an equalizing-bar movably secured to said bolt, substantially as described.

50. The combination with the side bar, of the barrel 18 pendent therefrom, the spring-seat 20 on the lower portion of the barrel, a spring on said seat, a cap exterior to the barrel and resting on said spring, diametrically-disposed slots 23 formed in said barrel, the bolt 25 movable in the barrel, a bar 24 extending from the bolt through the slots and engaging the cap 22, and the equalizing-bar 27 secured to said bolt, substantially as described.

51. The combination with the side bar 6 having the depending lugs 16, a pin 17 passing through said lugs, a barrel 18 supported from said pin, a spring supported on the exterior of said barrel, a bar 25 moving in said barrel, means for connecting said bar and said spring, and an equalizing-bar secured to said bar below said spring, substantially as described.

52. The combination with the side bar, depending lugs 16, a pin 17 in said lugs, a barrel 18 having an apertured head 19 through which said pin passes, the base of said head engaging the said lugs, a spring supported on the exterior of said barrel, a bar movable in said barrel, means for connecting said bar and said spring, and an equalizing-bar secured to said bar below said spring, substantially as described.

53. A spring link or hanger comprising the barrel 18 having an interior chamber, a thrust-bar 25 movable in said chamber, a seat 30 formed on the exterior of said barrel, a spring 21 resting on said seat and surrounding said barrel, a cap 21 resting on said spring and guided by said barrel, slots 23 formed in said barrel and a bar 24 extending from said thrust-bar through said slots and resting on the cap 22, substantially as described.

54. In a car-truck, the combination with the side frames, of eyebolts movably suspended from the side frames, bars movably secured to the eyebolts, springs combined with the eyebolts whereby said bars are elastically supported, a cross-beam supported by

said bars, one or more springs thereon, and a car-supporting bolster supported by said latter springs, substantially as described.

55. In a car-truck, the combination with  
5 the side frames, of link-sections pivoted to the said frames, eyebolts to which the link-sections are movably secured, bars movably secured to the eyebolts, springs on the link-sections whereby the bars are elastically supported, a cross-beam supported by said bars,  
10 one or more springs on the beam, and a car-supporting bolster supported by the latter springs, substantially as described.

56. In a car-truck, the combination with  
15 the side frames, of link-sections pivoted to said frames, eyebolts to which the link-sections are movably secured, bars movably secured to the eyebolts, spiral springs on the link-sections, cup-shaped spring-seats against  
20 which the spiral springs press, and a car-supporting bolster suitably supported on said bars, substantially as described.

57. In a car-truck, the combination with the side frames having axle-box pedestals,  
25 of the swing-links suspended from the side frames adjacent to said pedestals, inflexible equalizing-bars pivotally secured to said links below the side frames, and a cross-bolster connecting the equalizing-bars below the side  
30 frames, substantially as described.

58. In a car-truck, the combination with the side frames, of the links hung from the side frames, springs on the links, equalizing-bars supported by said springs, a cross-beam  
35 connecting the equalizing-bars, one or more springs on said cross-beam, and a bolster on the latter springs, substantially as described.

59. In a car-truck, the combination with the side frames, of the links hung from the side frames, spiral springs supported and  
40 guided by said links, equalizing-bars supported by said springs, a cross-beam connecting the equalizing-bars, one or more elliptical springs on said cross-beam, and a bolster on  
45 the latter springs, substantially as described.

60. In a car-truck, the combination with the side frames, of the links hung from the side frames, springs on the links, equalizing-bars supported by said springs, a cross-beam  
50 connecting the equalizing-bars, one or more springs on the cross-beam, a bolster on the latter springs, and transoms extending between the side frames between which transoms the said bolster lies, substantially as  
55 described.

61. In a car-truck, the combination with side frames provided with axle-box pedestals near their ends to receive axle-boxes, springs disposed between the boxes and pedestals,  
60 whereby said frames are cushioned on the axle-boxes, of a car-body-supporting bolster elastically suspended from the side frames, and a motor sustained at one end on one of the truck-axes, the support for its free end  
65 finding an ultimate bearing on the journal-boxes, substantially as described.

62. In a car-truck, the combination with

the side frames, of a car-body-supporting bolster, a beam pivotally and elastically suspended from the truck-frame below said bolster, and springs mounted on said beam and supporting said bolster, substantially as described.

63. In a car-truck, the combination with suitable side frames, of a swinging car-body-supporting bolster, a beam elastically suspended from the side frames below said bolster and a pair of elliptic springs mounted on said beam and connected with and supporting said bolster, substantially as described.

64. In a car-truck the combination with the side frames, links pivoted to said frames and movably connected to eyebolts, bars elastically suspended from said eyebolts, and a cross-beam supported by said bars, of elliptic springs mounted on said beam, and a car-body-supporting bolster mounted on said  
85 springs, substantially as described.

65. In a car-truck the combination with the side frames, of bars elastically suspended by link connections respectively from said frames, a beam extending transversely of the truck and resting on said bars, and a bolster supported on said beam, substantially as described.

66. In a car-truck, the combination with the side frames, of bars elastically suspended by link connections respectively from said side frames, a beam extending transversely of the truck and resting on said bars, a car-body-supporting bolster, and springs interposed between said beam and bolster, substantially as described.

67. In a car-truck, the combination with the truck-frame, of swing-links, a spring-plank, a bolster on the plank, and means for supporting the plank from the truck-frame, comprising springs and said links, substantially as described.

68. In a car-truck, the combination with the truck-frame, of swing links, a spring-plank, springs on the plank, a bolster on the springs, and means for supporting said plank from the truck-frame comprising said links and additional springs adapted to cooperate with said links, substantially as described.

69. In a car-truck, the combination with the axle-boxes, and side frames provided near each end with openings adapted to receive or straddle said axle-boxes, of springs supporting said side frames elastically on the axle-boxes, and a car-body-supporting bolster elastically suspended from said side frames, substantially as described.

70. In a car-truck, the combination with the axle-boxes, and side frames provided near each end with openings adapted to receive or straddle said axle-boxes, of spiral springs arranged within the openings of said side frames and elastically supporting the latter on the axle-boxes, a car-body-supporting bolster on the equalizing-bars, and appliances elastically suspending said bars directly from the side frames, substantially as described.

71. In a car-truck, the combination with the side frames, of links pivoted to said frames, eyebolts to which the links are movably connected, bars movably connected to the eyebolts, springs whereby the bars are elastically supported, a cross-beam supported by said bars, one or more springs on the beam, and a car-supporting bolster supported by the springs, substantially as described.

72. In a car-truck, the combination with the side frames, of links pivoted to said frames, eyebolts to which the links are movably connected, bars to which the eyebolts are movably connected, spiral springs supporting said bars, cups against which the spiral springs press, and a car-supporting bolster suitably supported on said beams, substantially as described.

73. In a car-truck, the combination with the side frames provided with openings near

their ends to receive or straddle the journal-boxes, and springs arranged between the tops of said openings and the journal-boxes, whereby said frames are cushioned on the journal-boxes, equalizing-bars spring-supported from the side frames, a bolster elastically supported on said bars, a motor supported at one end on one axle, the free end of the motor being supported on the journal-boxes of the truck through an intermediate connection, substantially as described.

Signed at the city of Philadelphia, county of Philadelphia, and State of Pennsylvania this 26th day of October, 1896.

GEO. MARTIN BRILL.  
SAML. M. CURWEN.

Witnesses:

R. S. REED,  
ISAIAH MATLACK.



No. 610,119.

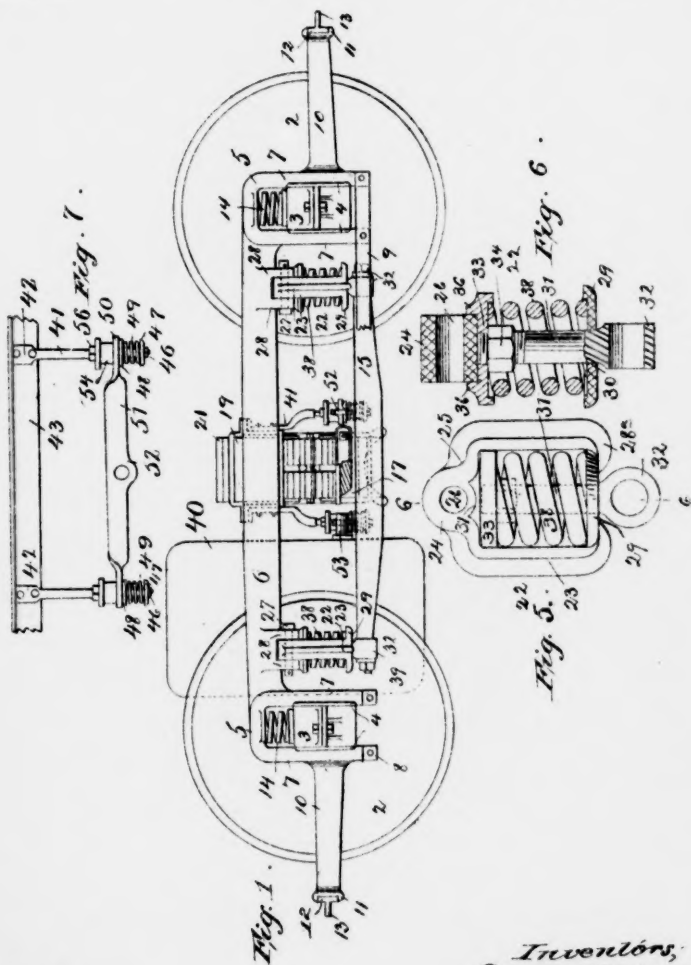
Patented Aug. 30, 1898.

G. M. BRILL & S. M. CURWEN.  
PIVOTAL TRUCK.

(Application filed June 23, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Attest:  
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Inventors,  
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 By *Joseph L. Levy*  
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No. 610,119.

Patented Aug. 30, 1898.

G. M. BRILL & S. M. CURWEN.  
PIVOTAL TRUCK.

(Application filed June 23, 1897.)

(No Model.)

3 Sheets—Sheet 2.

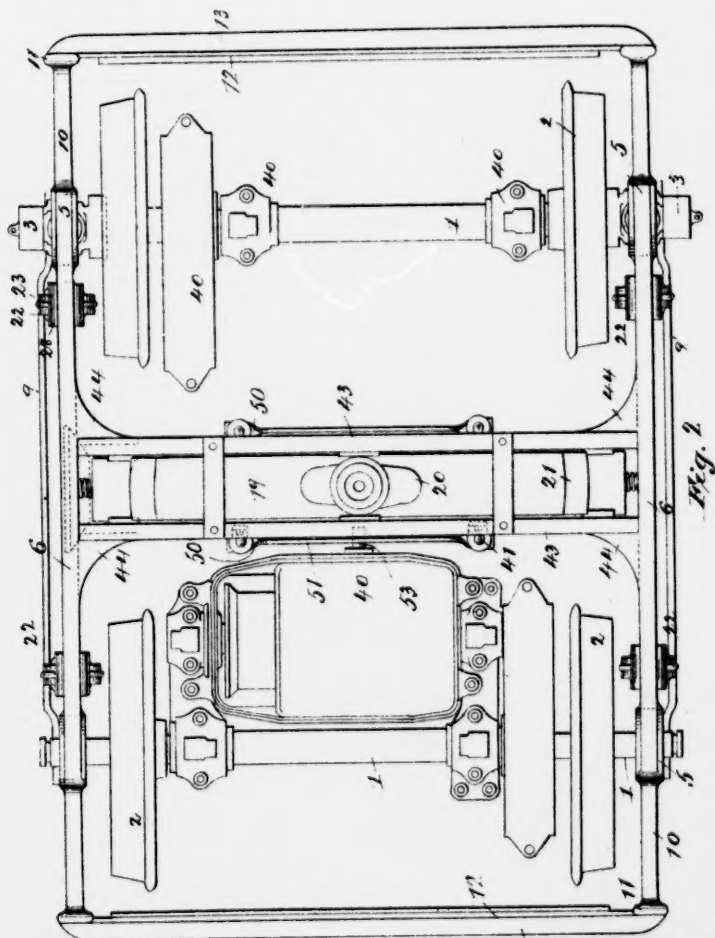


Fig. 2

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No. 610,119.

Patented Aug. 30, 1898.

G. M. BRILL &amp; S. M. CURWEN.

PIVOTAL TRUCK.

(Application filed June 23, 1897.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 3.

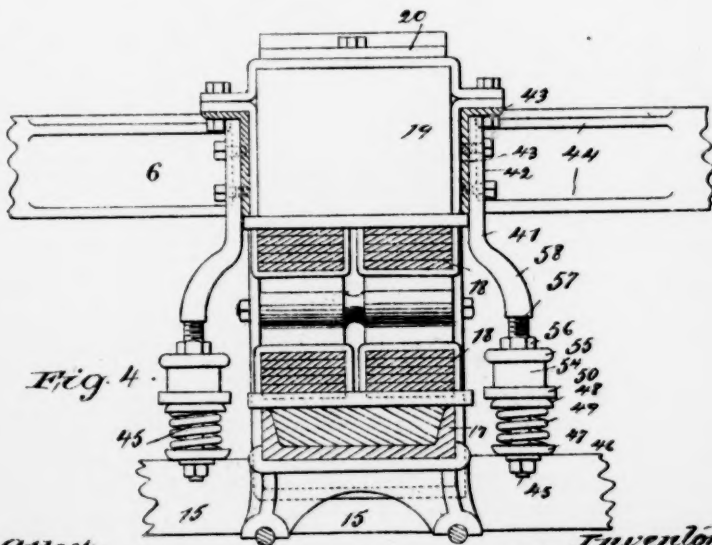
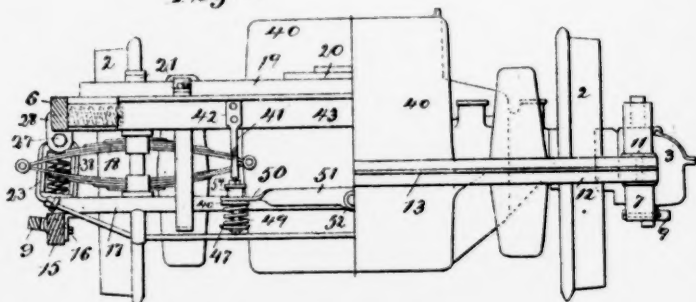
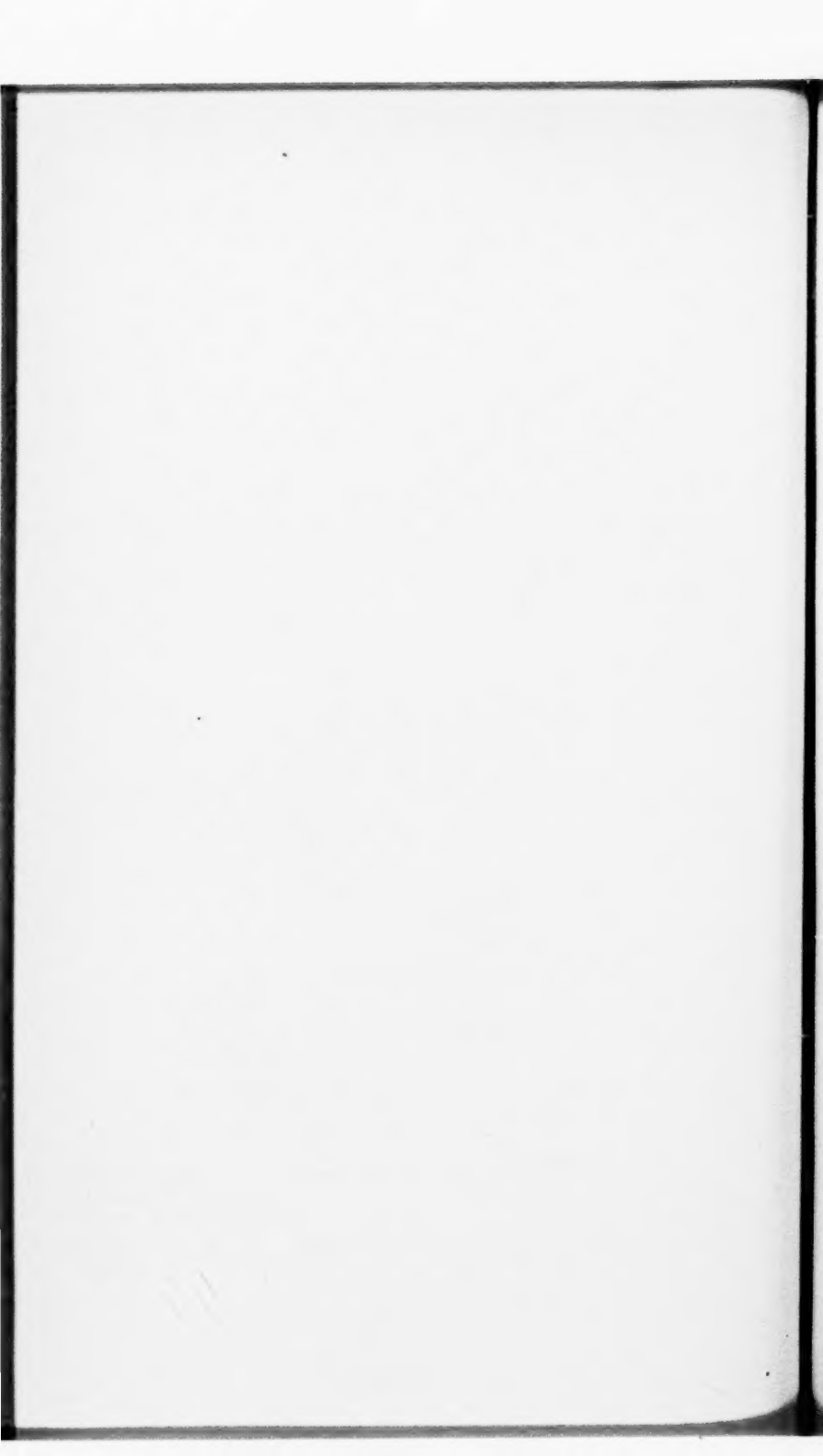


Fig. 4.

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# UNITED STATES PATENT OFFICE.

GEORGE MARTIN BRILL AND SAMUEL M. CURWEN, OF PHILADELPHIA  
PENNSYLVANIA, ASSIGNORS TO JOHN A. BRILL, OF SAME PLACE.

## PIVOTAL TRUCK.

SPECIFICATION forming part of Letters Patent No. 610,119, dated August 30, 1898.

Original application filed November 2, 1896, Serial No. 610,902. Divided and this application filed June 23, 1897. Serial No. 641,888. (No model.)

To all whom it may concern:

Be it known that we, GEORGE MARTIN BRILL and SAMUEL M. CURWEN, citizens of the United States, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, have made certain new and useful improvements in Pivotal Trucks, of which the following is a specification.

Our invention relates to improvements in the construction of car-trucks, and especially those adapted for passenger service; and the specific improvements hereinafter described relate to the subject-matter of an application filed by us on the 3d day of November, 1896, Serial No. 610,902, of which this application is a division.

The specific improvements claimed herein relate to the construction of the spring-links and the support for the motor, all of which are hereinafter described, and more fully pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a truck embodying our improvements. Fig. 2 is a plan view of a truck embodying our improvements. Fig. 3 is an end elevation of the truck, one half of which is cut away to illustrate the bolster construction and motor-support, the latter half being partly in section. Fig. 4 is an enlarged longitudinal sectional elevation through the bolster, showing a portion of the equalizing-bar and top chord of the side frame on one side of the truck and the motor suspension. Figs. 5 and 6 are respectively side and sectional elevations, enlarged, of the spring-link. Fig. 7 is a side elevation of a portion of one of the transoms and the motor-support secured thereto.

Similar numerals of reference indicate corresponding parts throughout the several views.

As this application refers, as above stated, solely to the specific construction of the spring-links and the motor suspension hereinafter described, we will confine ourselves in the following description to the parts of the truck more intimately connected therewith, cross-reference being had to said application for matters not hereinafter specifically mentioned upon.

A truck to which we have applied our spring-link, but to which form we do not limit ourselves, comprises the axles 1, the wheels 2, the journal-boxes 3, provided with vertical restraining-ribs 4, held in inverted-U-shaped yokes or pedestals 5, the yokes being connected together at the top by a top chord 6, the outside of the lower portion of the arms 7 of the yokes being recessed, as at 8, to receive a pedestal tie-bar 9, to which the yoke-arms are bolted, the tie-bar constituting a lower chord for the side frame and which is bent outwardly to give clearance for the swing of the equalizing-bars hereinafter described.

On the outer arms of the yokes, preferably on the same horizontal plane approximately with the axles, are outwardly-extending arms 10, formed with recessed jaws 11, in which is seated the bottom plate 12 of a T-iron cross-bar 13, the cross-bar tying the side frames together transversely.

The foregoing comprises the truck-frame, which may be variously termed an "axle-box frame" or "truck-frame," and the top chord may be termed the "side bar," and the top chord, yokes, and extensions the "side frame." The truck-frame is supported on the axle-boxes by springs 14, interposed between the tops of the yokes or pedestals 5 and the axle-boxes 3.

At 15 are longitudinally-disposed inflexible equalizing-bars, to the centers of which is secured—say, by the angle-iron 16—the transversely-extending sand or spring plank 17, which for the purposes of this particular application can be of any desired construction, or that of the application above recited, which sand-plank supports bolster-springs 18 and a bolster 19 of any desired construction, which carries the center and side bearings 20 21. The equalizing-bars 15 are supported from the top chord 6 or any other desirable portion of the side frames, preferably adjacent the yokes or pedestals, by the extensible spring-links 22, illustrated in detail in Figs. 5 and 6, the links comprising the rectangular-shaped stirrup 23, provided with a transverse enlargement 24 in its top cross-bar 25, in which is formed a hole 26 for the passage of a pin 27, which pivotally supports the stirrup in ears or lugs 28, de-

See Here follow diagrams marked p. 3 24 3 25 28 29

pending from the side bar 6. The lower transverse portion 28\* of the stirrup is enlarged to form the spring cup or base 29, and through the base is formed an opening 30, through which extends the eyebolt or thrust-bar 31, the eye 32 of which is exterior to the base and below it, the upper portion of the bolt being screw-threaded, and to which is secured a spring cap or follower 33, held in place by the nut 34. The nut 34 and follower 33 can be made in one piece and secured to the bolt 31 in the same way.

At each side of the top cross-bar 25 the follower 33 is extended upward by the lugs 36 about the sides of the cross-bar, against which the lugs bear to keep the follower in place in the stirrup, and in order to allow the latter to rest snugly against the lugs 36 on the side bar and to prevent turning of the follower or eyebolt the lugs 36 are curved downwardly at the top to form recesses or bearings 37, and between the follower and the base or cup 29 and about the eyebolt or thrust-bar 31 is the spiral equalizing-spring 38.

The aperture in the eye 32 of the bolt 31 is fitted over a rounded extension 39 of the equalizing-bars 15, so that the ends of said equalizing-bars are journaled in the end of said thrust-bar. Instead of employing the spiral spring we can employ cushions of rubber or the like, although coiled springs are preferred, as it is intended that such springs shall enter into the car-supporting spring system, of which the axle-box and bolster-springs form a part, as recited in said before-mentioned application.

The bolster, whether comprising the bolster proper, 19, the bolster-springs 18, and spring-plank 17, or a simple cross-bar, ties the equalizing-bars together transversely, and such bolster construction can have the capacity for transverse swinging movement through its articulated support from the side bars and is suspended from the side bars by the springs 38 in the links or hangers.

The weight of the car-body, whether supported on the bolster-spring, or directly on the spring-plank, is taken through the equalizing-bars to the link springs, which sustain their share of the load of the car, the follower 33, through the thrust-bar, having a downward movement, or a tendency thereto, when the weight comes from above, as from the car.

When the brakes are applied to the wheels, which are carried by the end of the truck-frame, as on the cross-bar 13, the tendency is to lift the truck-frame. This movement is resisted by the link-springs, which movement pulls the stirrup 23 upwardly against the weight of the car, which tends to keep the follower down on the top of the spring, compressing the link-springs and absorbing this movement, so that its effect is not materially felt on the car or bolster.

The motor-support is constructed as follows: At 40 is an electric motor, diagrammatically illustrated, one end being hung, sleeved,

or otherwise supported from the axle in the usual or desired way, the other end being upheld by the support hereinafter described. At 41 are pendent hangers, securely bolted at their upper ends 42 to the transoms 43 (the transoms being secured to brackets 44, as recited in said application) and the lower ends 45 being threaded to receive nuts 46, which support a spring-cap 47, above which is a spring-cap 48, between which spring-caps and about the ends 45 of the hangers are spiral springs 49, the cap 48 being movable on the hangers, and on the top of the spring-cap 48 rests the flat end 50 of a twisted cross-bar 51, which between the ends is disposed upwardly and which is provided with a central apertured enlargement 52 to receive the usual circular lug 53 on the end or casing of the motor, and above the end 50 of the cross-bar and upon it rests either a spiral spring or elastic cushion 54, and on the cushion rests a spring-cap 55, which abuts against a nut 56, movable on a thread 57 on the hanger, so as to adjust the tension of the springs, and holding the spring-cap 55 in position.

As illustrated in Fig. 4, the hangers are turned outwardly, as at 58, in order to clear the bolster-springs. This form of suspension enables the space between the bolster and axles to be utilized for the suspension of the motor, bringing the motor and its casing close up to the bolster, one of the essential features of this suspension being its connection with the transoms, which derive their support from the side bars of the truck, which in turn are resiliently supported upon the axle-boxes, so that the motor has a resilient support upon the axles through the axle-box springs 14 and an intermediate oppositely-acting resilient suspension on the truck-frame.

Having described our invention, we claim—

1. The combination in a car-truck, of the side frames, hangers pivotally suspended from said frames, a bolt movable in each of the said hangers, a follower on the bolt, a spring interposed between the hanger and the follower, equalizing-bars secured at their ends to the bolt exterior to the hanger, and a bolster secured to said equalizing-bars, substantially as described.

2. In a car-truck, the combination with the side frame having pendent lugs, a pin passing through each of said lugs, stirrups suspended by said pins, an apertured spring-seat on said stirrup, a spring on the seat, an eyebolt having an eye at one end exterior to the stirrup, and a follower on the other end resting on said spring, an equalizing-bar connected at its end to each of said bolts, and a bolster on said equalizing-bars, substantially as described.

3. In a car-truck, the combination with the side frames, the stirrups pivotally supported from the side frames, spring-seats formed at the lower portions of said stirrups, a spring on each of said seats, the equalizing-bars,

610,119

bolts on the ends of the equalizing-bars extending into said stirrups, connections between said bolts and the springs, and car-supporting devices resting on said bars, substantially as described.

4. The combination with the side frames, having the side bars, lugs on the side bars, stirrups suspended by the lugs, each stirrup having an aperture at the upper end and a spring-seat on the lower end, a pin passing through said lugs and aperture, springs on each of the spring-seats, the equalizing-bars and connected bolster, bolts extending from the ends of the equalizing-bars into the stirrups, and a follower in the stirrup resting on said spring, substantially as described.

5. The combination in a car-truck, of the side frames, the bolster, the equalizing-bars, the eyebolts movably secured to the ends of the equalizing-bars, a stirrup movably suspended from said side frames, said bolts having followers, and springs interposed between said followers and said stirrups, substantially as described.

6. In a car-truck, the combination with the top chord, of the link or hanger comprising the stirrups 23 having the top bar 25 provided with an apertured enlargement 24, apertured lugs on the top chord, a pin securing said stirrup to said lugs, an eyebolt and follower, a spring interposed between the follower and the stirrup, the follower having upwardly-extending lugs embracing the sides of the top bar 25, substantially as described.

7. In a car-truck, the combination of the side bar, with the stirrup 23 having a top cross-bar 25, a transversely-apertured enlargement 24 in the top cross-bar, a pin securing the enlargement to the side bar a spring-seat 29 formed on the lower cross-bar 28, an aperture 30 formed in said seat, a bolt 31 passing upwardly into the stirrup through the aperture in the seat 29, a spring 38 on the seat 29 surrounding said bolt, a follower 33 secured on said bolt and resting on said spring, an apertured eye 32 formed on the end of said bolt and a bolster secured through intermediate

connections to the said eye, substantially as described.

8. In a car-truck, the combination of the side bar, with the stirrup 23 having a top cross-bar 25, an apertured enlargement 24 in the top cross-bar, a pin securing said enlargement to the side bar, a spring-seat 29 formed on the lower cross-bar 28, a follower 33 within the stirrup, a bolt 31 passing into said stirrup through an aperture in the seat 29, said bolt being threaded and engaging a thread formed in the follower 33, a set-nut 34, engaging the follower, an apertured eye 36 formed on the said bolt exterior to the stirrup and a bolster secured through intermediate connections to said eye, substantially as described.

9. The combination in a car-truck and the axle-sustained motor, of the top chords of the truck-frame, a transom extending between said chords, hangers depending from and secured to said transom, a cross-bar extending between said hangers, springs on the hangers above and below said bar, a spring-cap secured to the hanger below the transom against which cap the upper springs bear, a stop on the hanger for confining said cap thereon and means for connecting said bar to the free end of said motor, substantially as described.

10. The combination with the side bars 6, of the transom 43 extending between the side bars, the hangers 41 pendent from the transom, the cross-bar 51 on the hangers, springs for supporting said bar on said hangers located below the bar, springs above said bar on said hangers, nuts below and above each of said last-mentioned springs and a thread on the hangers for engagement with said nuts, substantially as described.

Signed in the city and county of Philadelphia, State of Pennsylvania, this 17th day of June, 1897.

GEO. MARTIN BRILL.  
SAMUEL M. CURWEN.

Witnesses:

HENRY C. ESLING,  
W. M. ENLING, Jr.





No. 635,986.

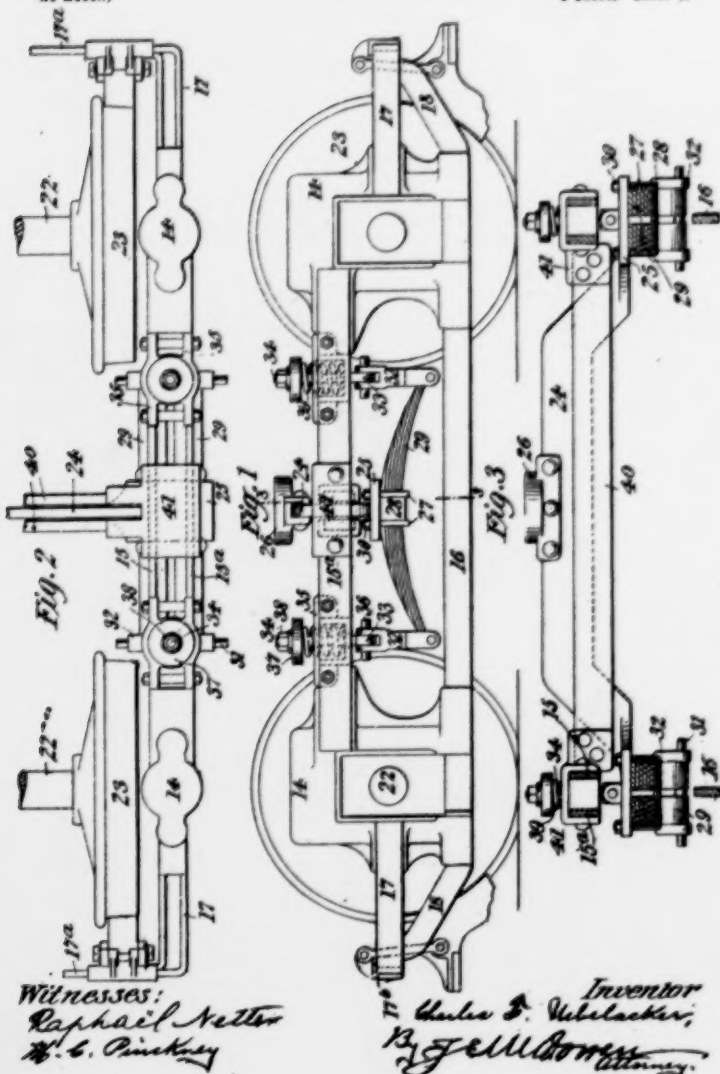
Patented Oct. 31, 1899.

C. F. UEBELACKER.  
CAR TRUCK.

(Application filed Oct. 30, 1897.)

(No Model.)

3 Sheets—Sheet 1.





No. 635,986.

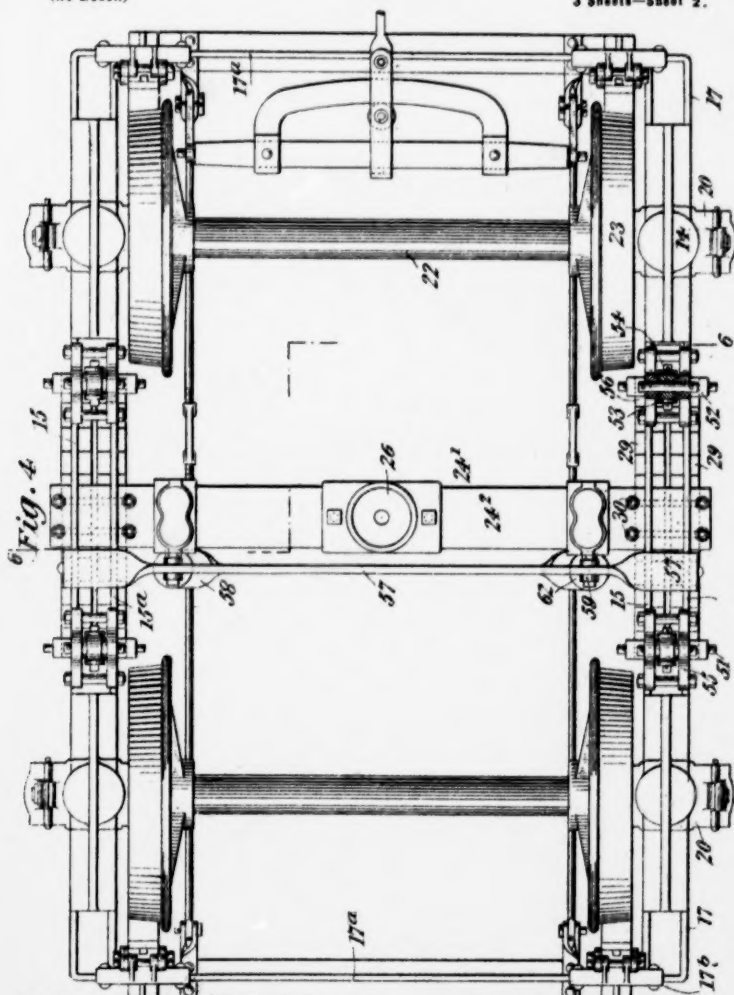
Patented Oct. 31, 1899.

C. F. UEBELACKER.  
CAR TRUCK.

(Application filed Oct. 25, 1897.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:  
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*W. C. Crinkley*

Inventor  
*Charles F. Uebelacker*  
*By J. M. Brown*  
 Attorney



No. 635,986.

C. F. VEBELACKER.  
CAR TRUCK.

Patented Oct. 31, 1899.

(Application filed Oct. 25, 1907.)

3 Sheets—Sheet 3.

(No Model.)

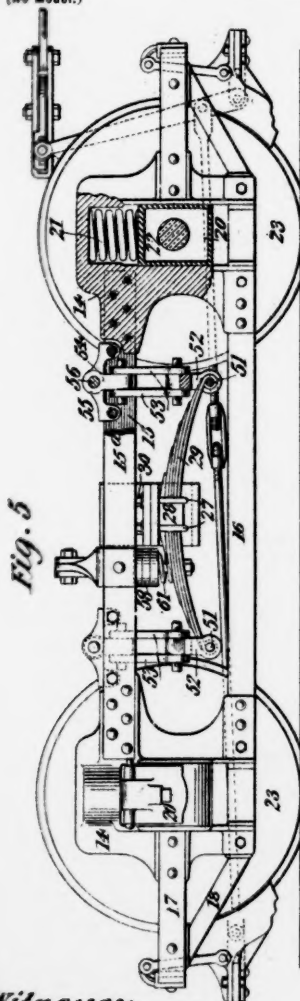


Fig. 5

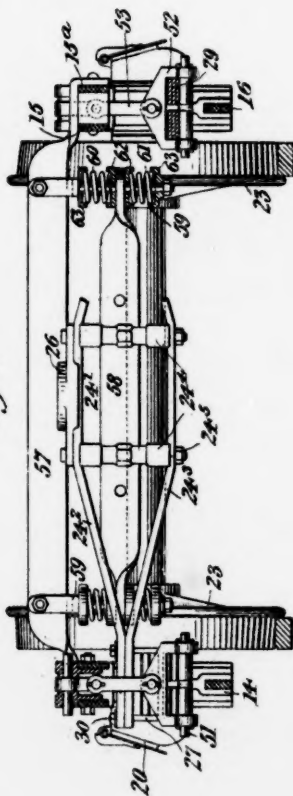


Fig. 6

Witnesses:

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W. C. PinckneyInventor  
Charles F. Vebelacker  
By J. M. Bonner  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES F. UEBELACKER, OF KINGSTON, NEW YORK, ASSIGNOR TO THE PECKHAM MOTOR TRUCK AND WHEEL COMPANY, OF SAME PLACE.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 635,986, dated October 31, 1899.

Application filed October 25, 1897. Serial No. 658,331. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES F. UEBELACKER, a citizen of the United States, and a resident of Kingston, Ulster county, State of New York, have invented certain new and useful improvements in Car-Trucks, of which the following is a specification.

This invention relates to improvements in car-trucks intended particularly for elevated or heavy suburban electric cars. The improvements are likewise adapted for cable or other street-railways.

The truck is of that class known as "double" trucks employed for supporting long car-bodies, the car being mounted upon a pair of the trucks.

The object of the present improvements is to construct a truck particularly adapted for carrying heavy car-bodies in high-speed service which shall support upon it a car-body through the instrumentality of a suitable center-bearing bolster in such manner that longitudinal as well as transverse movement of the car-body and supporting-bolster with relation to the truck structure may be provided for, so as to neutralize shocks imparted to the truck before such shocks can be transmitted to and affect the car-body. I accomplish this and other useful objects by the means hereinafter described, and more particularly set forth in the claims at the end of this description.

The accompanying drawings, forming part of this specification, illustrate in Figures 1, 2, 35 and 3 a truck embodying my improvements, the remaining views showing a truck embodying the leading features of the invention. Fig. 1 is a side elevation of the truck; Fig. 2, a ground plan of one side of the same; and Fig. 3, a vertical cross-section along line 3 3 of Fig. 1, looking toward the left. Fig. 4 is a ground plan of a somewhat modified form of the truck; Fig. 5, a side elevation, partly in section; and Fig. 6, a vertical cross-section along line 6 6 of Fig. 4, looking toward the left. Portions of Figs. 4 and 5 appear broken away.

In the several views like features are indicated by the same numerals of reference.

The side frames of the truck comprise yokes or pedestals 14, upper longitudinal

beams 15 15<sup>a</sup>, connecting the pedestals together at the top and preferably duplex, and lower longitudinal beams 16, connecting the pedestals together at the bottom, also end beams 17, connected to the pedestals 14 near the center of their vertical height, and preferably made duplex, as shown, and of less aggregate width than the upper longitudinal beams 15 15<sup>a</sup> and under truss-beams 18, extending from the outer lower ends of the pedestals 14 upward to the end beams 17, to which they are riveted. The central upper longitudinal beams 15 15<sup>a</sup>, which are the supporting-beams of the suspending appliances, are preferably placed farther apart than the end beams 17. This is to permit of the requisite swing of the links supporting the half-elliptic springs, which are suspended below said beams 15 15<sup>a</sup>, though, if desired, the end beams 17 may be spaced apart the same extent as the beams 15 15<sup>a</sup>, as in Fig. 4.

The truck has a short wheel-base, and its side frames are constructed to afford great strength, the beams being preferably made of soft steel, hot-riveted to the pedestals, which are likewise made of soft steel, the upper beams being inlaid in suitable flanged recesses on the faces of said pedestals before being riveted thereto. Lower beams 16 have their ends secured in pockets cast in the lower members of the pedestals before being riveted to the latter, and the under truss-beams 18 are in like manner secured to the pedestals. The outer members of the duplex end beams 17 are carried around transverse of the truck, as at 17<sup>a</sup>, and thus assist to hold the side frames in proper alignment. To the transverse end beams 17<sup>a</sup> are riveted the angle-beams 17<sup>b</sup>, which furnish supports for certain parts of the braking appliances. Braking mechanism is shown in the drawings, but forms no part of my present invention. The side frames of the truck as thus constructed afford the necessary stability for supporting the bolster and the weight imposed upon it at the wheel-base.

The journal-boxes are indicated at 20 and operate within the pedestals in the usual manner, 21 being spiral springs placed above the tops of the journal-boxes, (see Fig. 5,) said springs entering recesses in the top mem-

x Here follow diagrams marked p. 330 331 x 332

bers of the pedestals 14 and serving to spring-cushion the truck on the journal-boxes. The truck-axes are marked 22 and the wheels 23.

Referring now to Figs. 1, 2, and 3, which embody the preferred construction, 24 indicates a swinging bolster, made of a heavy flat bar, set on edge, and having its ends sloped downward and outward beneath the duplex beams 15 15', its extreme end portions being constructed as horizontal base-plates 25. The bolster is provided with swivel-plate 26, to which the car-body is adapted to be connected in the usual manner. 27 27 indicate yokes supporting a central shoe 28, which envelops the leaves of the duplex half-elliptic springs 29. The ends of yokes 27 pass upward through the base-plates 25 and are held in place above the latter by screw-nuts 30. The ends of the springs 29 are bent around pins 31, which pass through the lower ends of the universal links 32 transverse to the truck, the upper central portions of said links being divided, so as to permit of inserting between the same the lower flattened heads 33 of bolts 34, which extend upward and are adapted to play between the duplex beams 15 15' and through shoes 35, secured to and between said beams 15 15', some lateral play being allowed to the bolts 34, so that they may accommodate themselves to changes in the spans and positions of the springs 29. By means of the pins 36 at right angles to pins 31 and longitudinally of the truck the lugs forming the upper portions of universal links 32 are articulated to the heads 33 of bolts 34. 37 is a washer, and 38 a nut on bolt 34, a spiral spring 39 being inserted within a suitable recess of shoe 35 and interposed between the bottom of said shoe and washer 37, so as to yieldingly resist vertical play of the bolt 34.

In the construction described the suspending devices or appliances for the semi-elliptic springs are increased in length by supporting the upper ends thereof from the upper edges of the upper side beams and preferably by supporting said upper ends at a distance above said upper edges. This is done in the construction of Fig. 1 by extending the springs 29, which support the bolts 34, a distance above said upper edges, as shown. This lengthening of the suspending appliances is found advantageous, particularly because it gives an easier swinging bolster. By means of the recesses in bracket 35 the lengths of springs 39 are increased as they extend both above and below the supporting edges of the upper beams. This gives a good elastic support. The links 32 have a swinging motion on their supporting pivot-pins. There is also a further swing of the pivots themselves, owing to the elastic support at the upper ends. The latter motion, which may result from longitudinal movement of the bolster, compresses springs 39 more on one side of the spring than on the other, which tends to return the bolster to central position.

The numerals 40 indicate a pair of trans-

verse bars or transoms of U-shaped cross-section fixedly secured to shoes 41, riveted to the duplex beams 15 15' and between which the bolster 24 operates. The transoms add stiffness to the truck-frame laterally and serve to hold the transverse end beams 17' in rigid alinement. They also serve as a guide for the bolster 24 to prevent its movement to any considerable extent in a direction longitudinal with the car-body, and they further serve to transfer the draft of the propelling-motors from the truck to the car-body.

The drawings show a pair of half-elliptic springs 29 at each side of the truck-frame for supporting the ends of the bolster; but a single spring may be used, or more than two, the number depending on the weight of the car-body to be carried by the truck. By providing for the swinging of the bolster longitudinally with relation to the truck the latter is permitted to start in advance of the car-body and to thus impart its movement to the car-body without abruptness owing to the action of springs 29, which, being capable of varying their span and being supported by links yieldingly suspended, will neutralize in a measure sudden shocks imparted to the truck. The location of the half-elliptic springs between the beams of the side frames of the truck permits the drawing down of the bolster to the narrowest permissible width, thus shortening the wheel-base of the truck. This location of the semi-elliptic springs also imparts to them the properties of an equalizer, permitting any of the wheels to rise independently of the car-body and supplementing in this way the action of the pedestal-springs 21, located directly over the journal-boxes.

Referring to Figs. 4, 5, and 6, it will be seen that the construction of the side frames of the truck is substantially the same as that shown in the views of the drawings above described. In Figs. 4 to 6 the bolster 24' is constructed as a truss, comprising a top chord 24', bottom chord 24'', and suitable stays 24''' between the central portion of said chords, which are held in place by bolts 24'' in the usual manner. Each end of the bolster 24' is secured to the central shoe 28 of a pair of semi-elliptic springs 29 by yokes 27 and screw-nuts 30. The outer ends of said springs embrace pins 51, passing through the lower ends of yokes 62, forming parts of suspending appliances constructed similar to portions of chains, the upper links of which are represented by 53 and 54.

Fixedly secured to the duplex beams 15 15' are the brackets 55, carrying pivots 56, around which links 54, and with them lower links 53 and yokes 52, are adapted to swing, thus providing for changes in the spans of the springs 29 produced by varying loads and for the swinging of said springs and the car-body supporting bolster resting thereon longitudinally as well as laterally with relation to the truck-frame. The bolster 24' may be guided between transoms secured to the duplex beams



15 15<sup>a</sup> and when employed will perform the same functions as the transoms shown in Figs. 1 to 3.

5 A flexible support for the nose of an electric motor is embodied in the construction illustrated by Figs. 4 to 6, wherein 57 is a flat bar secured to the duplex beams 15 15<sup>a</sup> a suitable distance from the bolster and set on edge, except at its ends, where it is deflected so as to fit over the top edges of the beams 15 15<sup>a</sup> and against the outer surface of the outer beam 15<sup>a</sup>. Yieldingly suspended from said bar 57 by bolts 59, forked at their upper ends around the bar 57, to which they are attached, is the bar 58, adapted to support the nose of the motor at a suitable elevation. The bar 58 is also flat and is set on edge, with its ends deflected into horizontal portions, through which the suspending-bolts 59 pass, the horizontal ends of the bar 58 being between suitable shoes 62, within which spiral springs 60 and 61, which surround bolt 59, seat, the said springs also seating in similar shoes 63 on bolt 59 above and below the shoes 62. By this arrangement the spiral springs 60 and shoes 62 are adapted to play up and down on bolt 59, thus affording to the bar 58 a suitably-yielding support.

I do not wish to confine myself to the details and combinations of details herein set forth, as it will readily be seen by those acquainted with truck-building that various modifications might be made as to same without departing from the spirit of my invention.

35 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a car-truck, the combination with the side frames, comprising pedestals, duplex upper beams, and lower beams between the pedestals, of a car-body-supporting bolster, bolster-supporting spring-support supported center-bearing from said side frames to permit the bolster to move vertically, and appliances suspended from the duplex upper beams of said side frames and sustaining the spring-supports for the bolster and permitting the latter to move transversely and longitudinally with reference to the side frames.

50 2. In a car-truck, the combination with the side frames including upper and lower longitudinal beams, of half-elliptic springs suspended between said upper and lower side beams and a car-body-supporting bolster consisting of a flat bar set on edge and provided with horizontal base-plates at each end, appliances connecting said base-plates to aforesaid half-elliptic springs, and link appliances connected to the ends of said springs and suspended from the upper longitudinal beams of the side frames.

3. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes,

of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, springs upon which the ends of the bolster rest and to which they are connected, and suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams.

4. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, springs upon which the ends of the bolster rest and to which they are connected, suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams, and springs in the pedestals over the journal-boxes.

5. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, and two pairs of wheels and their axles and journal-boxes, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, the said bolster arranged transversely of the truck between the two pairs of wheels, half-elliptic springs upon which the ends of the bolster rest and to which they are connected, and suspending appliances connected to the ends of said springs and elastically supported at their upper ends on the said longitudinal beams.

6. In a car-truck having a short wheel-base, the combination with side frames having pedestals and upper longitudinal beams connecting the pedestals together, of a center-bearing bolster, that is a bolster carrying the weight of the car-body solely in the center, half-elliptic springs supporting the bolster, suspending appliances for said springs supported from said beams and extending from a distance above the beams to the half-elliptic springs below the beams, and springs between said beams and the upper ends of said suspending appliances.

7. In a car-truck, the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported from said beams and extending from a distance above the beams to springs 29 below the beams.

8. In a car-truck, the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported by said beams and extend-

ing from a distance above the beams to springs 29 below the beams, and springs between the beams and the upper ends of the suspending appliances.

9. In a car-truck the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported by the upper edges of said beams, and springs between said beams and the upper ends of said suspending appliances, said springs supporting said appliance on the beams.

10. In a car-truck the combination with the frame having pedestals and side beams connecting them near the tops of the pedestals, of brackets on the beams, springs supported by the brackets and extending above them, suspending appliances supported by said springs, springs 29, and a bolster supported thereby.

11. In a car-truck the combination with the frame having pedestals and side beams connecting them near the tops of the pedestals, of brackets on the beams, the brackets having recesses extending below the supporting part of the bracket, springs supported by the brackets in said recesses and extending above them, suspending appliances supported by said springs, springs 29, and a bolster supported thereby.

12. In a car-truck the combination with a bolster and springs 29, of links 32, bolts 34 pivotally connected to the links, and means for elastically supporting said bolts from the upper ends thereof.

13. In a car-truck the combination with a side frame, a bolster, and springs 29, of links 32, pins 31 connecting said links and springs,

bolts 34, and pivot-pins 36 at right angles to pins 31 and connecting the links and bolts.

14. In a car-truck the combination with a side frame, a bolster and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts, and springs supporting the bolts 34 from the side frame.

15. In a car-truck the combination with a side frame, a bolster and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts, a washer 37 held at the top of bolt 34, and a spring 39 supporting the washer and bolt.

16. In a car-truck the combination with a side frame having pedestals and duplex beams connecting the pedestals near the tops thereof, a bolster, and springs 29, of links 32, pins 31 connecting said links and springs, bolts 34, pivot-pins 36 at right angles to pins 31 and connecting the links and bolts.

17. In a car-truck the combination with pedestals and beams connecting them near the top, of a bolster, springs 29 below and supporting the bolster, links, pins extending in the direction transverse to the truck connecting said springs and links, pins at the upper ends of the links longitudinally of the truck, and means supported by the beams and connected to said longitudinal pins.

Signed at New York, in the county and State of New York, this 4th day of August, 1897.

CHARLES F. UEBELACKER.

Witnesses:

J. E. M. BOWEN,  
C. HOLLOWAY.

337

[British Coat of Arms.]

A. D. 1876, 27th May. No. 2230.

*Bearing Springs.*

Letters Patent to George Spencer, Civil Engineer, of 77, Cannon Street, London, in the County of Middlesex, and Edward Spencer Stidolph, Civil Engineer, of Langdale House, Greenwich, in the County of Kent, for the Invention of "Improvements in Bearing Springs for Carriages, Trucks, and Locomotive Engines for Railway, Tramway, and Common Roads."

Sealed the 15th August 1876, and dated the 27th May 1876.

Provisional Specification left by the said George Spencer and Edward Spencer Stidolph at the Office of the Commissioner of Patents on the 27th May 1876.

George Spencer, Civil Engineer, of 77, Cannon Street, London, in the County of Middlesex, and Edward Spencer Stidolph, Civil Engineer, of Langdale House, Greenwich, in the County of Kent. "Improvements in Bearing Springs for Carriages, Trucks, and Locomotive Engines for Railway, Tramway, and Common Roads."

Our improvements in bearing springs for carriages, trucks, and locomotive engines for railway, tramway, and common roads consist in applying a pad or pads of india-rubber or other suitable elastic material at the two ends of the laminated steel bearing springs of carriages, trucks, or locomotive engines used on railways, tramways, or common roads to absorb the shocks which the bearing springs sustain from the road or wheels not being true in line or form.

In the Drawing annexed our improvements are shown. In Figs. 1 and 2 the scroll iron A is formed so that both a bearing and rebound action is given by the pads of elastic material. B is a ring of india-rubber or other elastic material which acts as an assistant bearing spring. C is a ring of india-rubber or other elastic material which acts as a rebound ring.

Fig. 3 shows a modification of assistant bearing springs in which no rebound spring is used. These are shown hung in a vertical position, but they may be hung at an angle to the perpendicular if desired.

By our improved form the carriage or other vehicles may be raised by means of the screw at the bottom when required.

One object of these improvements is to give a better lateral action to the carriage body. To effect this the spring pin may be left somewhat free in its hole D; the hole E in the supporting bracket may be made conical, or spherical surfaces may be used to effect the same object.

What we claim as new in our Invention is—

1st. The use of the combined bearing and rebound springs.

2nd. The mode of leaving the carriage body to swing laterally.

338 Specification in pursuance of the conditions of the Letters Patent filed by the said George Spencer and Edward Spencer Stidolph in the Great Seal Patent Office on the 20th November 1876.

George Spencer, Civil Engineer, of 77, Cannon Street, London, in the County of Middlesex, and Edward Spencer Stidolph, Civil Engineer, of Langdale House, Greenwich, in the County of Kent. "Improvements in Bearing Springs for Carriages, Trucks and Locomotive Engines for Railway, Tramway and Common Roads."

Our improvement in bearing springs for carriages, trucks, and locomotive engines for railways, tramways, and common roads consists in applying a pad or pads of india-rubber or other suitable elastic material at the two ends of the laminated steel bearing springs of carriages, trucks, or locomotive engines used on railways, tramways, and common roads to absorb the shocks which the bearing springs sustain from the road or wheels not being true in line or form.

In the Drawing annexed our improvement is shown. In Figures 1 and 2 the scroll iron A is formed so that both a bearing and rebound action is given by the pads of elastic material. B is a ring of india-rubber or other elastic material which acts as an assistant bearing spring. C is a ring of india-rubber or other elastic material which acts as a rebound ring.

Fig. 3 shows a modification of assistant bearing spring in which no rebound spring is used. These are shown hung in a vertical position, but they may be hung at an angle to the perpendicular if desired.

By our improved form the carriages or other vehicles may be raised by means of the screw at the bottom when required.

One object of these improvements is to give a better lateral action to the carriage body. To effect this the spring pin may be left somewhat free in its hole D; the hole E in the supporting bracket may be made conical, or spherical surfaces may be used to effect the same object.

What we claim as new in our Invention is—

- 1st. The use of the combined bearing and rebound springs.
- 2nd. The use of the combined bearing without the rebound spring.
- 3rd. The modes of leaving the carriage body to swing laterally, as shown.

In witness whereof, we, the said George Spencer and Edward Spencer Stidolph, have hereunto set our hand- and seal-, this Twentieth day of November, in the year of our Lord One thousand eight hundred and seventy-six.

GEORGE SPENCER.

[L. S.]

EDWARD SPENCER STIDOLPH.

[L. S.]

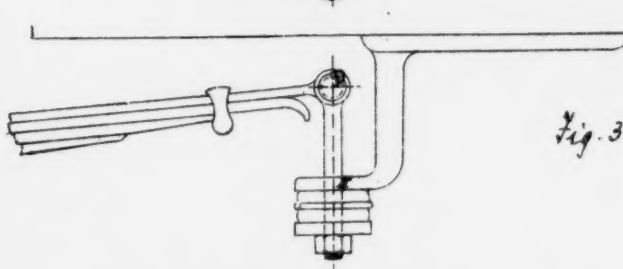
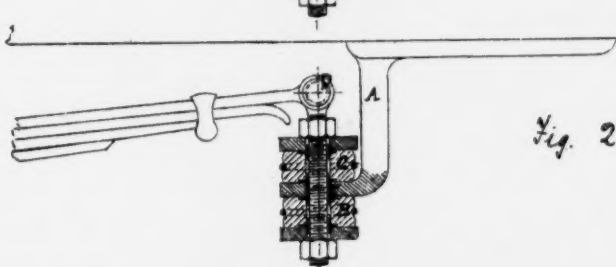
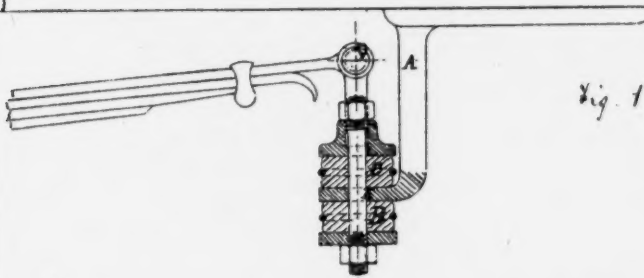
(Here follow diagrams marked pp. 339 to 372.)

A. D. 1876. MAY 27. No 2230.

(1 SHEET)

SPENCER &amp; STIDOLPH'S PROVISIONAL SPECIFICATION.

(2nd. Edition.)

*The drawing left with Provisional Specification is not colored.*

Mills &amp; Sons, Photo-Lith.



(No Model.)

276

W. BOUGHTON.  
VEHICLE SPRING COUPLING

No. 472,724.

Patented Apr. 12, 1892.

Fig. 1.

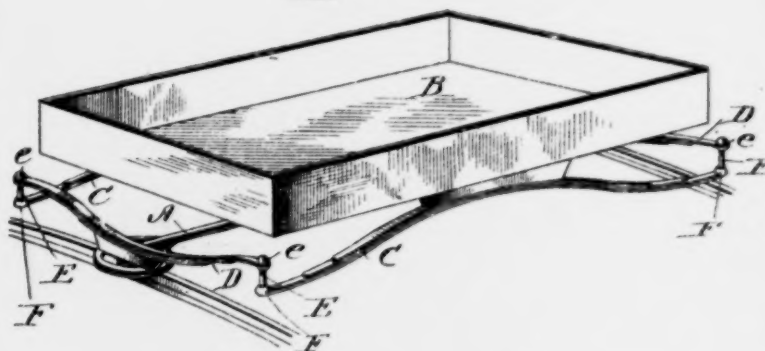


Fig. 2.

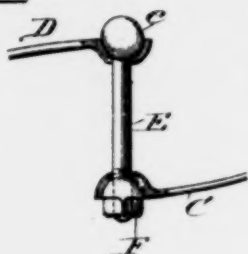


Fig. 3.

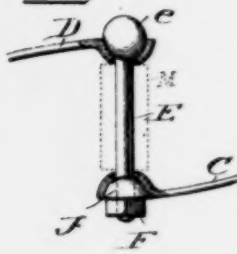


Fig. 4.



Fig. 5.



Witnesses  
*Wm. H. Hillyard*  
Wm. H. Hillyard.

Inventor  
William Boughton.

By his Attorney

*R. H. H. Hillyard*





# UNITED STATES PATENT OFFICE.

WILLIAM BOUGHTON, OF MANSFIELD, OHIO.

## VEHICLE-SPRING COUPLING.

SPECIFICATION forming part of Letters Patent No. 472,724, dated April 12, 1892.

Application filed July 6, 1891. Serial No. 392,566. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM BOUGHTON, a citizen of the United States, residing at Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Vehicle-Spring Connections or Couplings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to connections or couplings for vehicle-springs, and aims to replace the connections generally employed for connecting the ends of springs with the bolsters or with the side bars, be the latter rigid or spring, and for connecting the ends of springs with any portion of the vehicle-body or running-gears, whereby a universal hanger or connection is had to permit the body to swing in all directions to adapt itself to the direction of strain or jolt.

The improvement consists of the novel features and the peculiar construction and combination of the parts, which will be hereinafter more fully described and claimed, and which are shown in the annexed drawings, in which—

Figure 1 is a perspective view of a platform running-gear embodying my invention. Fig. 2 is a detail section showing the application of the invention on a larger scale. Fig. 3 is a section similar to Fig. 2, showing a modification in the employment of a semi-spherical washer between the ball-socket in the spring and the nut on the connecting or coupling bar. Fig. 4 is a detail perspective view of one end of the spring, showing the ball-socket formed therein. Fig. 5 is a view similar to Fig. 4 of the opposing end of the spring or part to which the aforesaid spring is connected.

The reach A, platform B, and the springs C and D are of well-known construction and arrangement and are shown simply to illustrate the application of the invention. Obviously the springs C may be any part of the vehicle or running-gear to which the springs D or their equivalent are usually attached.

The gist of the invention is ball-sockets in

the ends of the parts C and D. The coupling or connecting bar E is provided with ball on one end and is threaded at its opposite end, which receives the nut F. When the nut F is used alone, its working face is semi-spherical to correspond with the ball-socket in one of the parts C and D; but if a washer f is used the nut may be of usual construction and the washer will be semi-spherical on its working face.

In assembling the parts the connecting or coupling bar is thrust through openings in the ball-sockets in the parts C and D, and the nut or the washer and nut are applied to the threaded end. The openings in the parts C and D are sufficiently large to permit the coupling or connecting bar to play freely, whereby the vehicle-body is free to swing in any and all directions. The ball-sockets are pressed in the parts C and D, thereby attaining the desired end without making the parts unnecessarily heavy. Obviously by this connection a quarter-spring can be used and placed at any angle on the body or gear; also, the end of one spring being directly under the other gives it a bearing that is direct and will not cause the springs to twist and break, as it would if the bearing was at the edge or side of spring, the hanger passing directly through the end of spring, giving the ball a bearing that will not twist the spring. The coupling-bar is provided with a spring or rubber buffer, which comes between the springs, as shown by the dotted lines M in Fig. 3, to prevent the coupling from jumping and rattling.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a vehicle-spring, the combination, with the parts C and D, having ball-sockets in their exterior sides, of a coupling-bar having a ball at one end to fit in a socket in one of the parts and having its other end threaded, and a part adjustable on the threaded end of the said bar and having a semi-spherical working face to work in the socket in the other part, substantially as and for the purpose described.

2. The combination, with the end springs

x/ Here follow diagram marked p. 3 4 5

D and the side springs C, having ball-sockets in their ends, of single straight coupling-bars having a ball at one end to fit in a socket of one of the springs and having the other end threaded, and parts adjustably mounted on the threaded ends of the said coupling-bars and having semi-spherical working faces to fit in the sockets of the other or correspond-

ing parts, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM BOUGHTON.

Witnesses:

JESSE E. LA DOW,  
C. STELLA CLIFFORD.

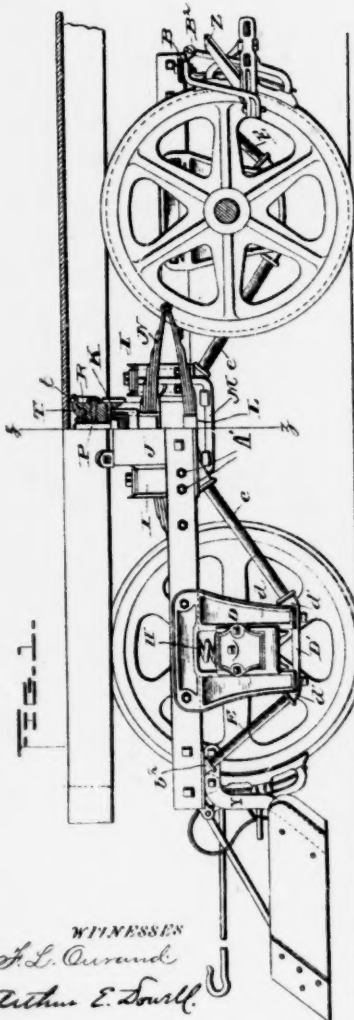
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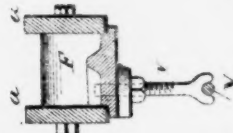
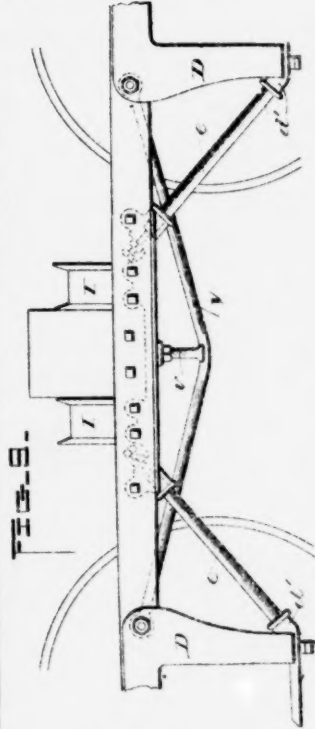
J. TAYLOR.  
CAR TRUCK.

No. 455,990.

Patented July 14, 1891.



WITNESSES  
*H. L. Curand*  
*Arthur E. Dorrill*



INVENTOR  
*John Taylor*  
*per T. H. Alexander*  
 Attorney



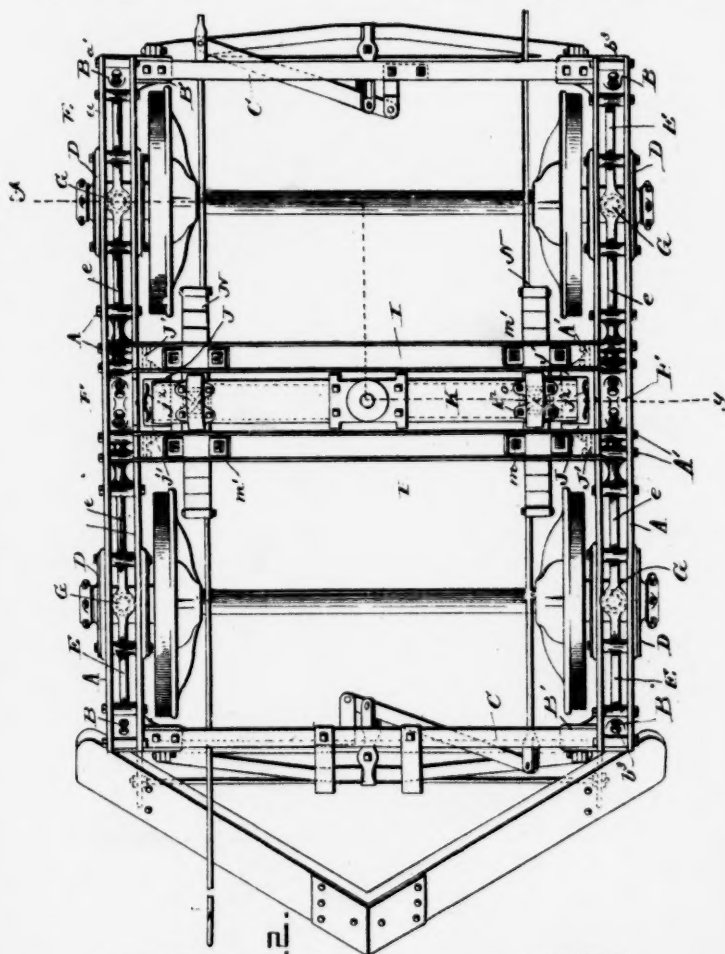
(No Model.)

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J. TAYLOR.  
CAR TRUCK.

No. 455,990.

Patented July 14, 1891.



WITNESSES  
*J. L. Curran*  
*Arthur E. Smith*

—H—  
 2.

INVENTOR  
*John Taylor*  
*per T. H. Alexander*  
 Attorney



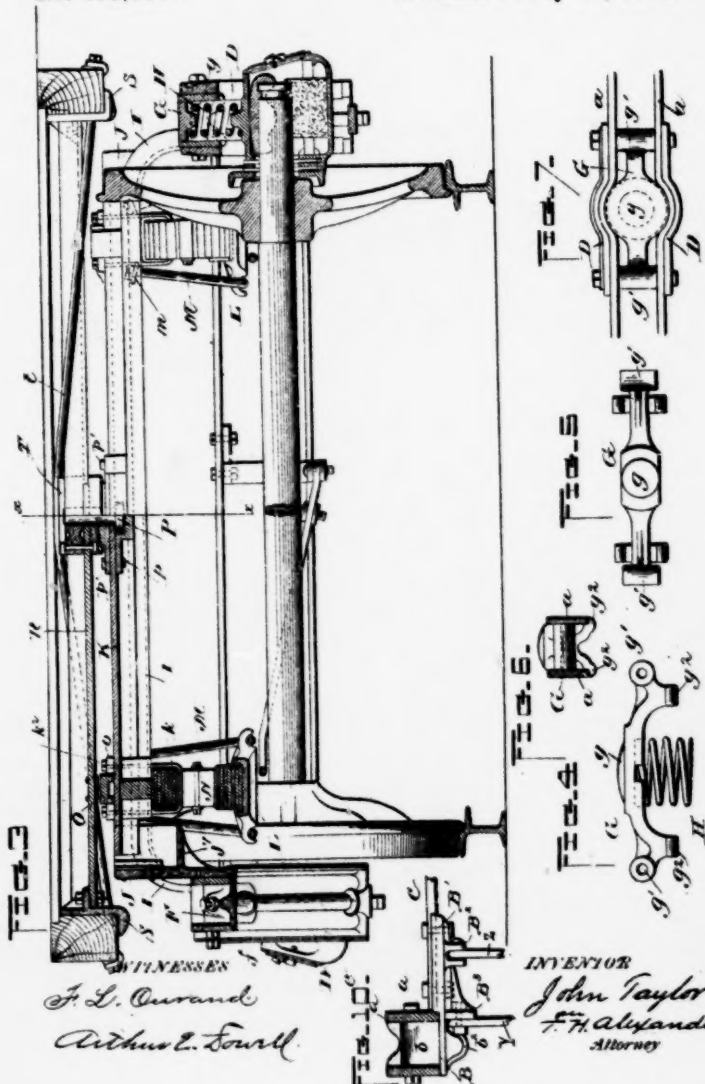
(No Model.)

3 Sheets—Sheet 2.

J. TAYLOR.  
CAR TRUCK.

No. 455,990.

Patented July 14, 1891.







# UNITED STATES PATENT OFFICE.

JOHN TAYLOR, OF TROY, NEW YORK.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 455,990, dated July 14, 1891.

Application filed November 23, 1890. Serial No. 372,019. (No model.)

To all whom it may concern:

Be it known that I, JOHN TAYLOR, of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Car-Trucks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a half side elevation and half sectional view of my improved car-truck, the line of section being indicated by line *x x*. Fig. 2 is a plan view thereof. Fig. 3 is a double central transverse vertical sectional view thereof on line *yy*. Fig. 4, the respective part sections being distinguished by line *x x*. Figs. 4, 5, 6, and 7 are detail views of the castings *C*. Figs. 8 and 9 are details of a center brace. Fig. 10 is a detail view of a lower casting *B*.

This invention is an improvement in car-trucks; and its objects are to produce a truck having an open center between the wheels, and strong, simple in construction, and easy riding; and to these ends it consists in the novel construction and combination of parts hereinafter clearly described and claimed.

Referring to the drawings by letter, *A A* designate the side beams of the truck, which are preferably composed of parallel bars *a a*, set edgewise and united by transverse bolts, which pass through sleeves or castings interposed between the bars *a*, as shown.

*B B* designate the castings secured between the bars at the ends of the beams. These end castings have a vertical portion *b*, which is laterally perforated for the reception of bolts *a'*, which secure them to the bars, and they depend below the beams somewhat and have lateral inwardly-projecting extensions *B'*, which are flanged on the upper side edges to receive ends of bars *C C*, that constitute the ends of the truck and unite the side beams, as shown. On the lower side of extension *B'* is a pair of depending perforated ears *B''*, between which the brake-suspending link *Z* is hung, and a depending perforated transverse flange *B'*, to which is bolted the upper end of the fender-supporting iron *Y*. The portion *b* has a depending socket portion *b'*,

which inclines inwardly toward the journal-box casting, but is closed at top.

*b'* is a tap-bolt through portion *b*, entering the bore of the socket. The journal-box castings *D* are bolted to the side beams near the ends thereof, as shown, and the lower ends of the jaws *d* of the castings are connected by a transverse bar *D'*. On the outer sides and lower ends of jaws *d* are formed upwardly-inclined sockets *d'*, in which are set the lower ends of inclined braces *E e*. The upper ends of outer braces *E* are engaged in sockets *b'* of castings *B*, while the upper ends of inner braces *e* are engaged in similar but oppositely-inclined sockets *b'*, formed in castings *F*, that are secured between the members of the beams, as shown, about centrally between box-castings *D*. By this construction the ends and centers of beams are strongly braced from boxes. The castings *F* are formed with transverse sleeves, through which pass bolts uniting bars *a*.

*G* designates castings having a central cap portion *g* and opposite sleeves *g'*, united to the cap by lateral webs, and from the webs thereof depend lugs *g''*, which are lipped under the side bars of the beams, as shown in Fig. 6, to relieve shearing strain on the bolts, which secure the castings to the members of the beams between the members of the journal-box castings and above the journal-boxes, and coiled springs *H* are interposed between the boxes and caps *g*, thereby supporting the frame on the axles, as indicated. In detail Fig. 7 this cap is enlarged and bars *a* bent accordingly to accommodate springs of greater diameter.

*I I* designate a pair of channel-bars that are secured to the side beams about centrally and transversely of the frame. The ends of said bars are bent downwardly, as indicated, so that the bodies thereof are above the plane of the frame.

*J J* designate metallic castings attached to the side beams between the ends of bars *I I* and rising slightly above said bars. These castings *J* are provided at bottom with laterally-projecting flanges *J'*, which overreach the ends of bars *I*, and *A' A'* are bolts transfixing flanges *J'*, ends of bars *I*, the beams and the castings *J*, as indicated, and when

343, 344, 8345  
diagram marked p. 343, 344, 8345  
Here follow

properly nutted bind all said parts securely together. The upper portion of casting J is formed with inwardly-projecting flanges j and bottom or shelf j' to receive and guide the ends of a bolster K, and j<sup>2</sup> are springs secured to the casting to relieve the shock of impact of the bolster thereagainst.

I, L represent stirrup-blocks suspended from bars I by hangers M M near the sides of the truck, the upper ends of which irons pass through openings in bars I and are secured by nuts m, and washers m' are interposed between the nuts and bars. The stirrup-blocks depend barely below the beams.

N N designate springs supported on the stirrup-blocks below bars I and transversely thereto, and on these springs is supported the bolster K, which lies transversely of the truck between and above bars I. The bolster is secured to the springs by clip-irons k and nuts k'. The ends of the irons pass through perforated ears o o of chafing-plates O, resting on the bolster, and secure said plates to the bolster and the latter to the springs.

P designates the king-bolt secured centrally to the bolster by plates p and bolts p'.

R designates a channel-iron bar, which is pivoted on said bolt, being provided with suitable chafing-plates, and its ends are bolted to angle-iron S, secured to the side sills of the car-body. By this construction the body-bolster R is carried up between the sills of the body, thus lowering the body nearer the rails. To further support the sills of car truss-rods are arranged on the sides of bar R and parallel therewith, being supported at center on a chair-casting T, and their ends pass through the sills and are secured thereto by lippped washers and nuts, as shown.

The particular features of this truck are the transverse and longitudinal motions permitted the bolster without interfering with the movements of the truck-frame, the arrangement of spring whereby the bolster and frame are amply cushioned and yet an open center left between the wheels, so that electric motors can be conveniently attached to the truck; also the wheels can be set close together and the body of car is lowered, reducing the height of car-steps.

The invention is designed more particularly for double truck-cars. If it is desired to further stiffen the side beams, truss-rods V may be used, as shown in detail, Figs. 8 and 9. These rods are suspended between the members of the beams, being attached to the castings G or to bolts secured to the beams, and at center they support an upright stud-bolt v, which centrally sustains a plate attached to the beam between bars I, or bolt v may be connected directly to castings F. The bolts v are provided with adjusting bolts and nuts for regulating the tension on the truss-rods.

What I claim as new is—

1. The combination of the side beams, the corner-castings attached thereto, having in-

wardly-projecting extensions, and the end bars bolted to said extensions, substantially as described.

2. The combination of the side beams, the journal-box castings attached thereto, the socket-castings attached to the ends and centers of said beams, the inclined brace-rods connecting the jaws of the journal-box castings to said socket-castings, and the end bars bolted to projections on the end castings, substantially as specified.

3. In a car-truck, the combination, with the truck-frame, of a pair of independent swinging hangers at each side of the frame, and the elliptical springs arranged parallel with the side beams of the truck-frame and suspended by said hangers, whereby an open center is left between the wheels and the bolster supported on said springs, substantially as set forth.

4. The herein-described castings B, for the purpose set forth, having socket b', flanged extension B', depending flange B', and ears B'', substantially as specified.

5. The combination of the side beams, the journal-box castings, and the journal-box with the cap-casting G, secured to the beam above the journal-box, and a coiled spring interposed between the journal-box and cap-casting, substantially as described.

6. The combination of the side beams, the journal-box castings attached thereto, the castings attached to the ends of the beams, having sockets and inwardly-projecting extensions, and the end bars connected to said extensions, with the journal-boxes, the castings secured to the beam above the same, and the coiled spring interposed between the boxes and the cap-castings, substantially as described.

7. The combination of the side beams and the journal-boxes and journal-box castings and the end castings H, central castings F, cap-castings G, springs H, bars C, and brace-rods E e, substantially as described.

8. The combination of the side beams, the transverse bars having downwardly-bent ends secured thereto about centrally of the frame, the stirrup-blocks suspended from said bars by hanger-irons, springs supported on said blocks, and the bolster supported on said springs between and above the bars, substantially as described.

9. The combination, with the side beams, the journal-box castings, and brace-rods on opposite sides thereof, of the central truss-rods V and stud-bolts v, all substantially as set forth.

10. The combination of the frame, the bars I I, castings F, the truss-rods V, and stud-bolts v, substantially as set forth.

11. The combination of the side beams, the transverse bars secured thereto about centrally of the frame, the stirrup-blocks suspended from the said bars by hanger-irons, the springs supported on said blocks, and the bolster mounted on said springs, with the

455,990

3

casting bolted to the beams between the bars and having inwardly-projecting flanges to guide the ends of the bolster, substantially as specified.

5 12. The herein-described truck, consisting of side beams, the journal-box castings attached thereto, the corner-castings attached to the ends of the beams, having inwardly-projecting extensions, the end bars attached  
10 to said extensions and the central castings attached to the beams, the inclined brace-rods connected to the journal-box castings and to said end and center castings, the pair  
15 of parallel transverse bars having downwardly-bent ends attached to the side beams

about centrally of the frame, the stirrup-blocks suspended from said bars, springs mounted on said blocks, the bolster mounted on said springs, and the castings secured between the bars and having guide-flanges between which the ends of the bolster are guided, substantially as specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN TAYLOR.

Witnesses:

SAUL SHANFIELD,  
C. E. CANFIELD.



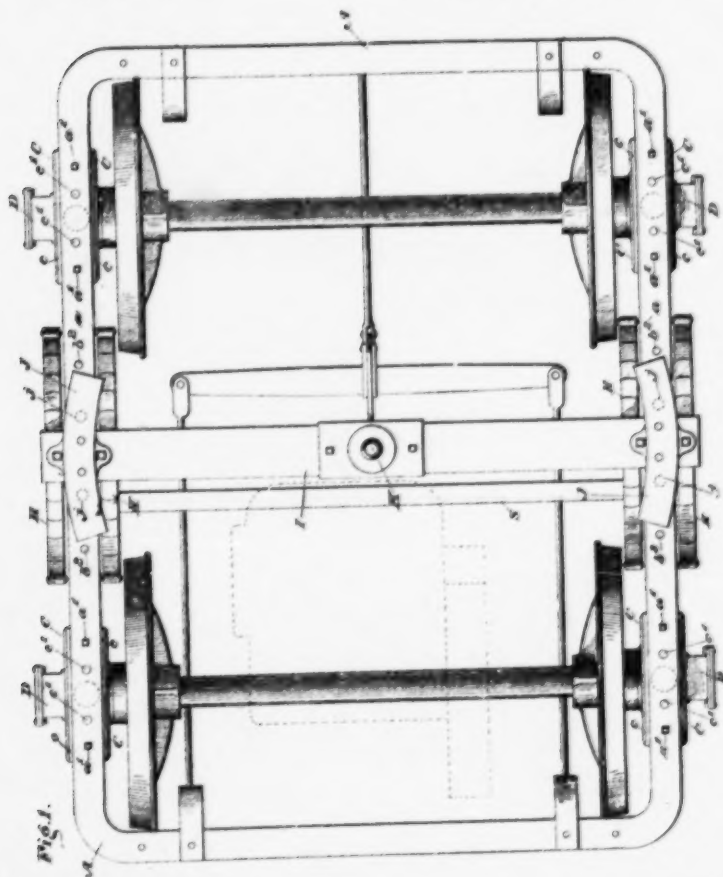
(No Model.)

3 Sheets—Sheet 1.

J. TAYLOR.  
CAR TRUCK.

No. 507,050.

Patented Oct. 17, 1893.



Witnesses

*J. Taylor*  
*James R. Mansfield*

By his Attorneys:

Inventor

*John Taylor*  
*Alexander & Howell*



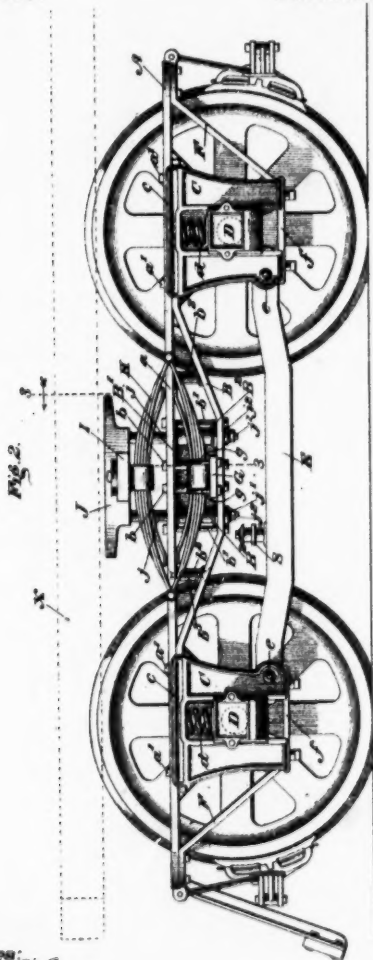
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3 Sheets—Sheet 2.

J. TAYLOR.  
CAR TRUCK.

No. 507,050.

Patented Oct. 17, 1893.



Witnesses:

*J. E. Taylor*  
*James A. Mansfield*

By his Attorneys,

Inventor.

*John Taylor**Alexander D. Howell*





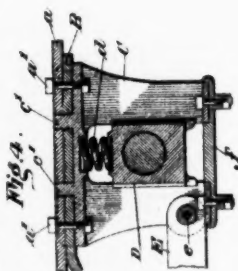
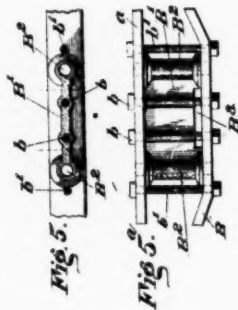
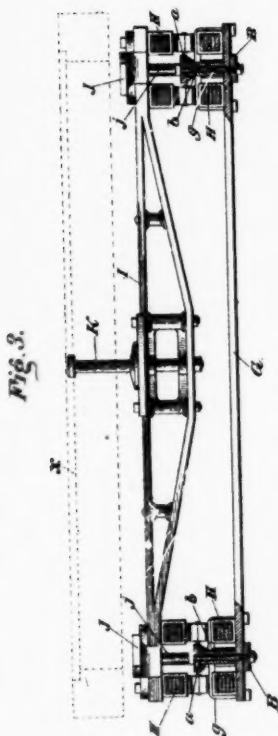
(No Model.)

J. TAYLOR.  
CAR TRUCK.

3 Sheets—Sheet 3.

No. 507,050.

Patented Oct. 17, 1893.



Witnesses:

*McFauler*  
*James R. Mansfield*

By his Attorneys,

Inventor:

*John Taylor.*

*Alexander S. Howell.*



# UNITED STATES PATENT OFFICE.

JOHN TAYLOR, OF TROY, NEW YORK.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 507,050, dated October 17, 1903.

Application filed April 13, 1899. Serial No. 470,228. (No model.)

To all whom it may concern:

Be it known that I, JOHN TAYLOR, of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Car-Trucks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improved pivotal four-wheel truck especially designed for electrical motor cars, in which the car bodies are mounted on trucks, one at each end of car, and the object of this invention is to provide a truck which will be of great strength, simple in construction, and having a close wheel base, and in which the motor-casing and mechanism can be suspended so as to be readily accessible without removing any part of the truck.

The invention is more fully related to the truck, shown and described in an accompanying application for Letters Patent filed April, 1893, and serially numbered 472,236, and the present invention has especial reference to the construction of the truck frame, and the peculiar mountings of the bolster thereon as will be clearly understood from the following description and claims.

In the drawings, Figure 1 is a top plan view of my improved truck. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical transverse sectional view through the same on line 3—3 Fig. 2. Figs. 4, 5 and 5\* are details.

A designates a metallic frame formed of a continuous flat metal bar laid flatwise and extending around the truck forming the top and main portion of the truck frame. Underneath each side portion *a* of the frame A is an inverted arched truss bar B the ends of which extend slightly beyond the pedestals C, C, at the sides of the truck frame. These truss bars are designed to carry the weight of the car body and between the centers of the bar B and frame A are placed castings B' which have one or more vertical openings near their centers for the passage of uniting bolts or rivets *b* and have vertical sleeves B'' at their ends, the openings in said sleeves coinciding with openings in the frame and truss bars as shown for the passage of bolster guiding pins hereinafter referred to. Exten-

rior to castings B' the frame A and bars B are united by tie bolts *b'* and intermediate the castings B' and pedestals C, the frame and bars may be further united by bolts *b''* which pass through separating and bracing sleeves *b''* interposed between the bars and frame as shown. The ends of bars B may be rigidly united to the frame by welding, riveting or otherwise as desired.

The pedestals C, C, resemble ordinary car pedestals, and have lips *c* on their upper edges which embrace the lateral edges of bars B and frame A, and the pedestals are rigidly secured to the frame and bars by vertical through bolts *a'* which pass through the top of pedestals as shown. To prevent shearing strain on bolts *a'*, studs *c'* are secured or cast on the top of the pedestals, and holes are made through the frame and bars B at proper points to fit over these studs, so that when weight is superimposed on the frame, intermediate the pedestals, the shearing off of the bolts *a'* by the longitudinal bending strain on the frame and bars is prevented.

The axle journal boxes D are of any suitable construction, and between them and the tops of pedestals are placed helical springs *d* so that the frame has a spring mounting on the axles.

E designates the bottom stays between adjoining pedestals preferably constructed of two flat bars arranged parallel and set edgewise, and secured to the pedestals by bolts *e*. The jaws of the pedestals are connected by braces *f* and flat metallic braces F are secured between the outer legs of pedestals and the corners of the frame so that the sides of the truck frame are thoroughly braced and trussed. The motor suspension bar S may be supported on the bottom stays E.

G designates a transverse stay bar extending across and between bars B, lying midway between the wheels. The ends of bars G pass through suitable recesses B'' in the lower edges in castings B' and may be transfixed by bolts *g* so as to be rigidly connected to the truss bars, or otherwise suitably secured against endwise movement.

H, H, are elliptic springs placed on the ends of bars G one at each side of each bar B. The adjoining springs H are secured in position on bar G by clips *g*. The springs H

349 3.50 73.51  
 Here follow diagram marked p. 349

are constructed preferably as described in my aforesaid application.

I designate a bolster consisting of two flat metal bars laid flatwise, the lower one being 5 trussed, and the whole constructed as described in my aforesaid application. The ends of this bolster are supported upon the springs H, H', and upon the bolster above the springs are rigidly secured curved side-bearing castings J, J', curved on the arc of a circle having the king bolt in the center of bolster for its axis. From the said castings J 10 depend guide pins j, j', which are rigidly connected thereto one at each side of the bolster, and said pins depend through the sleeves B', 15 and the corresponding openings in the frame and bars, as shown, being free to move vertically to permit the expansion and contraction of the springs, being limited in their upward movement by nuts j' on their lower 20 ends; cushions j' of any suitable material are interposed between the nuts and bottoms of bars B. These guide pins prevent longitudinal or lateral vibration of the bolster, and 25 transfer the longitudinal and torsional thrusts of the bolster produced when the truck is rounding curves direct to the frame instead of through the springs and spring mountings.

The car body X is secured on the truck bolster by a king bolt K; thus there is but one direct connection between the body and truck and that is in the center of truck, so that the truck pivots at a fixed central point enabling the trucks to be run safely at a high speed 35 around curves.

In this truck it will be observed that the weight of the body is transferred through the bolster springs H and bar G direct to the centers of truss bars B, B, so that the frame A 40 serves principally as a brace and does not carry much weight. The bar G constitutes a tie bar to prevent the truck frame spreading laterally as well as a support for the springs. The motor suspension bars will also assist in 45 preventing spreading of the frame.

While I have described the side pieces B' and bearings J as "castings" I contemplate making them of wrought metal and also welding them to the connected parts if desired, 50 and consider such covered by the claims.

Semi-elliptic springs may be sometimes used for the full elliptic case though the latter are preferred by me. It will further be 55 observed that the springs are arranged parallel at each side of the frame and that they lie exterior to the wheels and intermediate the pedestals. This construction leaves ample room for the motors between the wheels.

Having described my invention, what I 60 claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination with a continuous truck frame, of a transverse stay bar, rigidly connected to and suspended from the main frame 65 elliptical springs placed parallel with and on each side of the truck frame inside and outside thereof intermediate the pedestals, and

all secured to and supported on the stay bar, substantially as described.

2. The combination with the truck frame 70 and the pedestals, the inverted truss bar, and the transverse stay bar supported thereon: of the elliptical springs arranged outside and inside the frame at each side thereof intermediate the pedestals and secured to and 75 supported on said stay bar, substantially as specified.

3. The combination with a continuous truck frame of the springs placed parallel and on each side thereof inside and outside the frame 80 intermediate the pedestals and all being outside the wheels; with the bolster mounted on said springs and the guide pins for the bolster at the ends thereof, substantially as and for the purpose set forth.

4. The combination with the truck frame 85 and the pedestals, with the springs arranged outside and inside the frame at each side thereof, said springs being located intermediate the pedestals and exterior to the truck wheels; with the bolster mounted on said 90 springs, and guide pins for the bolster at each end thereof, substantially as described.

5. The combination with a continuous truck frame, of elliptical springs placed parallel 95 inside and outside the frame at each side thereof intermediate the pedestals and all being outside the wheels; with the bolster mounted on the springs and guide pins for the bolster at each end thereof playing through 100 guide openings on the frame, substantially as and for the purpose set forth.

6. The combination in a truck frame, of the top frame, the pedestals, the flat inverted truss bar, intermediate the pedestals and connected 105 to the tops thereof, and the side castings secured between the truss bar and top frame intermediate the pedestals, the bolster supporting springs, the bolster and guide pins fixed to the bolster playing through guide 110 openings in the castings, substantially as described.

7. The combination in a truck frame, of the top frame, the pedestals, the flat inverted truss bars intermediate the pedestals and connected 115 to the tops thereof, and the side castings secured between the truss bar and top frame intermediate the pedestals, and the transverse tie bar supported by said truss bars and lying intermediate the wheels, substantially as described. 120

8. The combination in a truck frame, of the top frame, the pedestals, the flat inverted truss bar intermediate the pedestals and connected 125 to the tops thereof, and the side castings secured between the truss bar and top frame intermediate the pedestals; with the springs supported upon the truss bars intermediate the wheels, the bolster mounted on said springs, and the guide pins connected thereto 130 playing through vertical sleeves on the castings, substantially as described.

9. The combination in a truck frame, of the top frame, the pedestals, the flat inverted truss

bar intermediate the pedestals and connected to the tops thereof, and the side castings secured between the truss bars and top frame intermediate the pedestals, and the transverse tie bar supported by said truss bars and lying intermediate the wheels; with the springs supported upon the ends of tie bar, the bolster mounted on said springs, and the guide pins attached to the bolster, substantially as described.

10. The combination in a truck frame of the top frame formed of a continuous flat metal bar laid flatwise, the inverted truss bars attached to the side portions of said frame, the pedestals attached to the frame and ends of truss bars, the parallel elliptical springs supported by said truss bars located at each side of and parallel with each side bar and all outside the wheels and the bolster mounted on said springs, above the frame, substantially as described.

11. The combination in a truck frame, of the top frame formed of a continuous flat metal bar laid flatwise, the inverted truss bars attached to the side portions of said frame, the pedestals attached to the frame and ends of truss bars, the springs supported by said truss bars and the bolster mounted on said springs, the castings interposed between the truss bars and frame, and the guide pins attached to the bolster depending through sleeves on said casting, substantially as specified.

12. The combination of the pedestals having studs on their tops, the truss bars supported on said pedestals having openings to receive said studs, the top frame and the castings secured between the truss bars and frame intermediate the pedestals, substantially as described.

13. The combination of the pedestals having studs on their tops, the truss bars supported on said pedestals having openings to receive said studs, the top frame and the castings secured between the truss bars and frame intermediate the pedestals, the springs supported on said truss bars, the bolster mounted on said springs, and the guide pins

for the bolster, substantially as and for the purpose specified.

14. The combination of the pedestals having studs on their tops, the truss bars supported on said pedestals having openings to receive said studs, the top frame and the castings secured between said truss bars and frame intermediate the pedestals, the transverse tie bar supported on said truss bar and extending beneath the castings, the springs mounted on said bar, the bolster superimposed on said springs, and the guide pins for the bolster, substantially as described.

15. The combination in a truck frame, of the top frame formed of a continuous flat metal bar laid flatwise, the inverted truss bars attached to the side portions of said frame, the sleeved castings interposed between the truss bars and frame, the transverse tie bar supported on and connecting said truss bars, the pedestals attached to the frame and ends of truss bars, the bottom stays between the pedestals the corner braces, the bolster springs, the bolster supports thereon, and the guide pins playing through the sleeves on the castings, substantially as and for the purpose set forth.

16. The combination in a truck frame of the top frame, formed of a continuous flat metal bar laid flatwise, the inverted truss bars attached to the side portions of said frame, the castings interposed between the truss bars and frame, the pedestals attached to the frame and ends of truss bars, the bottom stays between the pedestals and the corner braces, the springs supported on the truss bars, the bolster and the guide pins therefor, all constructed and arranged to operate substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN TAYLOR.

Witnesses:

CORNELIUS J. EARLEY.  
JAMES H. McGRAN.



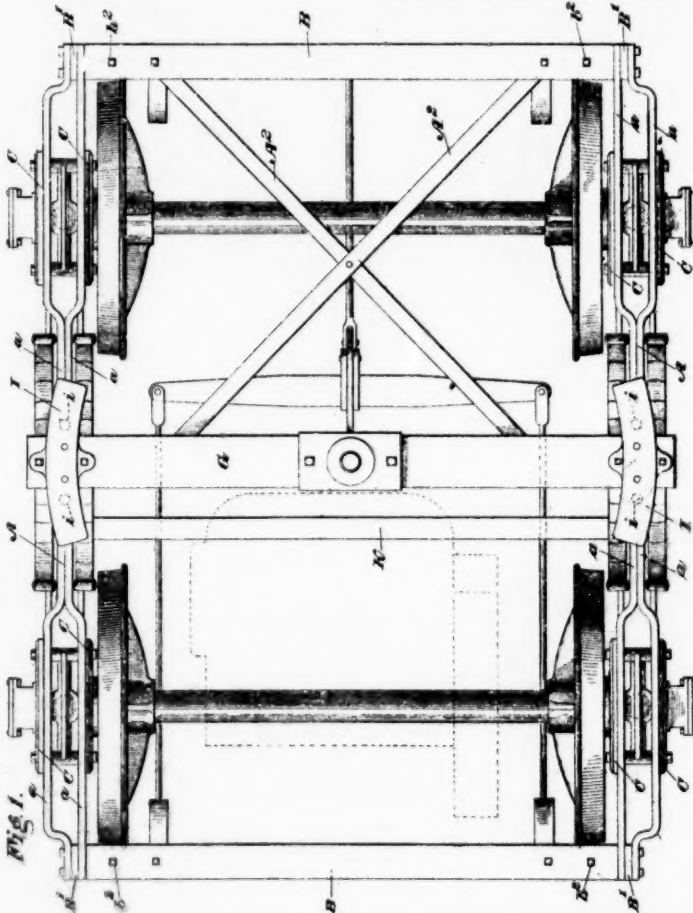
(No Model.)

3 Sheets—Sheet 1.

J. TAYLOR.  
CAR TRUCK.

No. 507,855.

Patented Oct. 31, 1893.



Witnesses:

*M. Fowler*  
*R. Mansfield*

By his Attorneys.

Inventor

*John Taylor*  
*Alexander Dowell*





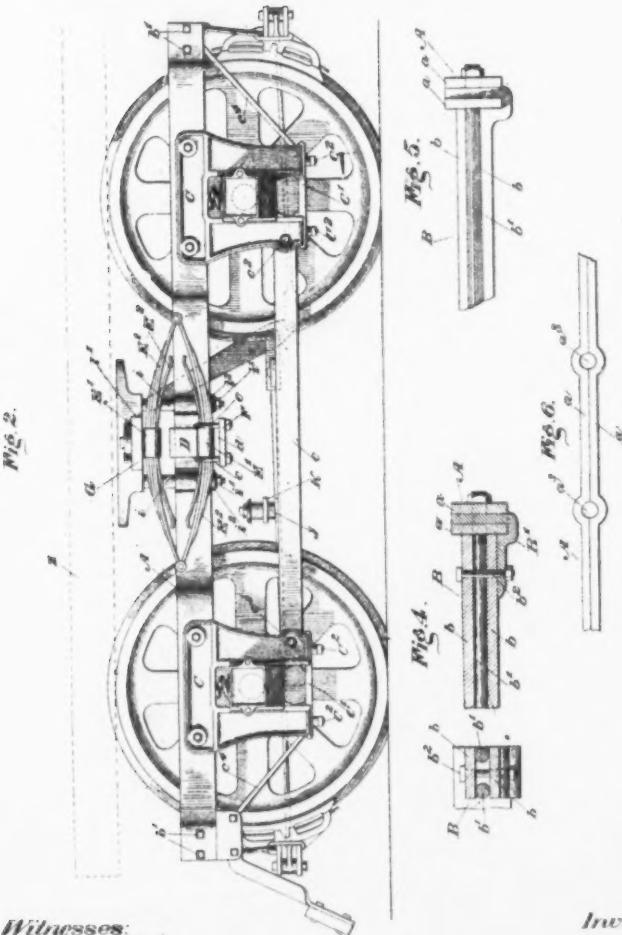
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3 Sheets—Sheet 2.

J. TAYLOR.  
CAR TRUCK.

No. 507,855

Patented Oct. 31, 1893.



Witnesses:

*McLaurer*  
*James Mansfield*  
 By his Attorneys.

Inventor:

*John Taylor*  
*Alexander Dowell*



(No Model.)

3 Sheets—Sheet 3.

J. TAYLOR.  
CAR TRUCK.

No. 507,855.

Patented Oct. 31, 1893.

Fig. 3.

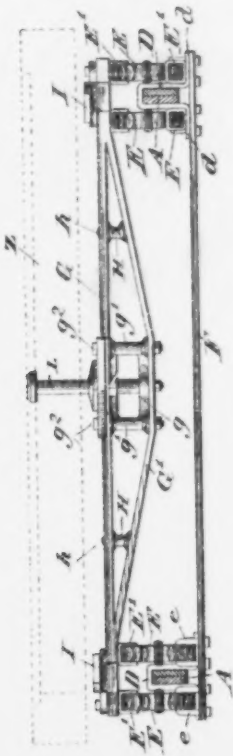


Fig. 10.



Fig. 8.

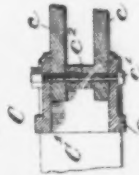
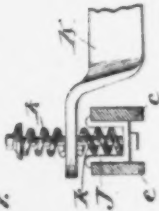


Fig. 9.



Fig. 7.



Witnesses:

*McFowler*  
*James R. Mansfield*

Inventor:

John Taylor

by *Alexander Howell*

Attorneys



# UNITED STATES PATENT OFFICE.

JOHN TAYLOR, OF TROY, NEW YORK.

## CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 507,855, dated October 31, 1893.

Application filed April 12, 1893. Serial No. 470,047. (No model.)

To all whom it may concern:

Be it known that I, JOHN TAYLOR, of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Car-Trucks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention is an improvement in car trucks, and is especially designed for electric railway cars wherein two four-wheeled trucks are employed, one at each end, such trucks being commonly termed "pivotal" trucks.

The objects of the invention are to produce a pivotal truck having a short wheel base, and wheels of equal diameter and the pivot on a king bolt connected to a bolster located centrally between and above the axles so as to allow ample space for the reception of electric motors at either side of the bolster, and to permit ready access to the motor case by having room enough to allow the top of case to be swung up, and the bottom of case to be lowered so that the armature can be conveniently examined or removed and replaced without disturbing or taking apart any piece of the truck or of the car body.

Other objects are to overcome jarring, pounding and rocking of the car body by the passage of the truck around curves, or over rail joints, switches, crossings, &c., by mounting the truck frames on the axles by long coiled springs over each journal, and by employing full elliptical springs, one on each side of each side beam intermediate the wheels upon which springs the bolster is supported.

I also reduce the width of the side beams, or distance apart of the members thereof intermediate the pedestals so that the truck will be reduced in width yet have room for the inside elliptical springs to clear the wheels, while the outer springs project but slightly beyond the axle boxes or pedestals, so that the sides of truck or parts thereof shall not project beyond the sides of the car body.

Another object of my invention is to provide a pivotal truck, which when used in electric cars will admit of their being run at a high speed around curves with perfect safety and without any necessity for slowing up, as

it is generally necessary to do when the trucks for electrical railway cars are used, and by my construction the cross beams on each side of the truck bolster which have been employed in pivotal trucks for steam cars are done away with, thus enabling the wheel base to be smaller than where they are used, and yet my truck frame is simple, strong and durable, and will be positively safe when running at a high rate of speed.

My invention therefore consists in the novel construction of the truck frame, and in novel details of construction, and sub-combinations of parts which I will now describe in detail, referring to the drawings, in which—

Figure 1 is a top plan view of my improved truck. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical transverse sectional view on line 3—3 Fig. 2. Figs. 4, 5, 6, 7, 8, 9 and 10, are details.

The main frame is composed of side beams A and end beams B. The side beams are formed of two parallel flat metal bars a set edgewise. Between the pedestals these bars touch, and are rigidly united by welding, riveting, bolts, or other suitable means separated over the axles where the pedestals C, C, are attached to them so as to accommodate long coil springs, and spring caps such as are shown and described in my Patent No. 455,990, of July 14, 1891. The ends of bars a are rigidly united at the extremities of the beam. The end beams B are also constructed of two flat metal bars b laid flatwise, one above the other, and between the ends of beams A, A, to which they are rigidly united by means of transverse tie rods b' lying intermediate bars b and extending through suitable openings in bars a as shown, and preferably nutted at both ends.

An angular bracket casting B' may be employed as shown in Fig. 2 at the corners of the frame, one arm of the bracket being braced between bars a and transfixed by rods b' while the other arm of the bracket underlies the ends of the lower bar b and is transfixed by bolt b', extending through both bars a, as shown. Instead of using the bracket B', the ends of the lower bar b may be bent as shown in Fig. 4 so as to enter between the ends of bars a. The bars b may also be bound together by intermediate bolts. I would also

355,356 & 357  
 diagram marked p.p.  
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say that the corners of the frame may be made with corner irons as shown in my patent aforesaid. By this construction of frame the side beams are capable of withstanding the severe twisting and thrusting strains produced by the lurching of the body on the truck-bolster without injury or yielding.

To further strengthen and stiffen the frame two intersecting braces A<sup>3</sup> may be used on the end of truck where the motor is not suspended, the braces being connected to an end beam B and to an intermediate transverse tie-bar which is secured centrally between the beams A as hereinafter described. Said braces are sufficiently above the axle to give ample clearance for the action of the coil springs over journal boxes. Between the legs of the pedestals are stays C' shouldered between the legs and extending to the outside thereof and also lipped to the outside of the pedestal as shown being secured thereto by bolts C<sup>2</sup>. These stays can be readily removed by loosening the nuts on these bolts, so that the wheels and axles can be readily removed from the frame.

Between the pedestals on each side of the truck and resting on the bottoms thereof are two bottom stays formed of flat bars c set edgewise and secured to the pedestals by bolts or rivets c' with a pipe thimble c<sup>2</sup> on the bolts to hold the bars apart, and by which means the two pedestals are securely united together. At each corner of the truck is a flat brace c' which extends from the bottom of outer leg of the adjoining pedestal to the outer end of side beams and is suitably secured at each end. By this means a stiff and strong metallic truck frame is produced, and each side thereof is thoroughly braced and trussed. In the center and hung upon each side beam is an inverted U-shaped yoke D the lower ends of which are bent at right angles to form steps d upon which are seated elliptic springs E, E, one at each side of each side beam as shown. These springs are held in place by means of clips e which are bolted to a tie bar F extending across the truck frame, at the centers thereof. The yokes are rivetted or bolted to the side beams to prevent their moving thereon. The bar F constitutes a rigid connection between the opposite side beams, and being nearly on a line with the centers of axles prevent the frame spreading, and the pedestals from being forced out of line by reason of the end thrust of the axles when rounding curves at high speed. This plate also prevents the ends of yokes from sagging by reason of the weight of car resting on springs E, E. Between the main leaves of each elliptic spring E and the confining band E' are placed short auxiliary spring-leaves E<sup>2</sup> the ends of which are curved more than the main leaves, so that after the spring is compressed a certain extent, the ends of leaves E<sup>2</sup> contact thereby re-inforcing the springs and adding to its sustaining capacity. The truck bolster is constructed of two flat

metal bars, laid flatwise, the top bar being straight, and the bottom bar G' inversely arched or trussed and separated from the top plate by a center casting g which has a central vertical opening for the passage of the king bolt, and two sleeves g' on its ends for the passage of tie bolts g<sup>2</sup>. To further strengthen the bolster, small tubular columns H, H, are placed between bars G, G' at each side of casting g, through which pass the tie bolts or rivets h. The ends of bars G and G' are rigidly united by welding, riveting or other suitable manner. The bolster overlies bar F and is supported upon springs E, E, as shown. Near each end of the bolster and firmly secured thereon above the springs is a side bearing casting I, horizontally curved as shown, on the arc of a circle having a king bolt as a center. These castings have transverse recesses I' to receive the ends of bolster, and are further secured thereto by bolts or rivets as desired. To each side bearing is rigidly secured depending guide pins i one at each side of the bolster, which depend through corresponding vertical guide holes a<sup>2</sup> in the side beams, formed exactly on the center line thereof, as by expanding the bars a, a, at the points where such openings are to be made as indicated in Fig. 6 of the drawings. On the lower ends of these guide pins and below the side beams are nuts i' screwed on with suitable devices to prevent them unscrewing, and between the nuts and lower edge of side beams are cushions j of rubber or metal springs which will prevent shock when the elliptic springs react, when the car is in service. Thus when the truck is in use, the weight of the car body on the bolster is transferred to the frame through springs E, E, and when they act the guide pins play up and down through the openings in side beams so that a perfectly free and elastic action is allowed the car body.

The guide pins serve to keep the truck square, and also prevent the side beams spreading, and thus the cross centers commonly used in steam railway car trucks are dispensed with.

Between bars c are secured stop castings J through which pass vertical bolts j to which are secured the ends of the motor suspension bar K which extends across the truck from one bottom stay to the other, and can be placed edgewise or flatwise, as the motor may require. The suspension bar also serves to prevent the frame or pedestals spreading laterally and assists in overcoming the end thrust of the axles. Cushioning springs k are inserted between the ends of bars K and the castings J, and cushioning springs may also be placed above the same. These springs may be of rubber or metal as indicated in Figs. 7 and 8.

The position of the motor is indicated in dotted lines in Fig. 1.

The car body Z is mounted on the bolster and side castings and is fast to the truck

only at one point, the king bolt L. Therefore the body will not be affected by the oscillations of the truck due to rapid travel over switches and railjoints, and as the truck radiates beneath the car on a positive center, there is no danger of the wheels being forced off the rails, and the truck readily shifts on curves.

I would say that I contemplate making the side bearing I of wrought metal, and may weld them onto the bolster so as to form the bolster and side bearings virtually in one piece and consider such construction covered in the claims.

In Fig. 9 I have shown a modified construction of the side beams in which one solid bar is used between the pedestals swollen out at the points where holes  $a^3$  are made, and split at the ends or having two bars welded on at each end to receive the pedestals. This form I also consider equivalent to that before described, and covered by my claims.

As some persons prefer wooden frames, I have indicated the side beams as made of wood in Fig. 10, being reinforced on each side by metal plates. The yoke on which the springs are mounted would be hung over these side beams as above described. Therefore I do not limit myself to the employment of the novel spring mountings of the bolster or metallic frames alone.

I would further add that semi-elliptic springs may be sometimes employed instead of the full elliptic springs, and when "elliptical" is used referring to springs both full elliptic and semi-elliptic springs are embraced.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the side beams of a truck frame, and the yokes hung thereon intermediate the pedestals, of elliptical springs on each side of each side beam of the frame supported on said yokes, all exterior to the wheels, substantially as specified.

2. The combination with the truck frame, of parallel elliptical springs located on each side of each side beam of the frame intermediate the pedestals, and all exterior to the wheels and the bolster supported on said springs, and the guide pins for the bolster, substantially as described.

3. The combination with the side beams of a truck, of elliptical springs beside each side beam and parallel therewith intermediate the pedestals, and all exterior to the wheels the bolster mounted on said springs and the guide pins for the bolster, substantially as specified.

4. The combination with the side beams of a truck frame of elliptical springs on each side of each side beam of the frame and intermediate the pedestals, and all exterior to the wheels and the bolster mounted on said springs, and the guide pins for said bolster, substantially as set forth.

5. The combination of the truck frame, and the bolster supporting springs with the bol-

ster mounted thereon, and the guide pins for said bolster attached thereto and playing through guides on the frame substantially as described.

6. The combination of the truck frame, with the bolster mounted thereon, and the guide pins for said bolster attached thereto and playing through guides on the frame, and the springs interposed between the bolster and frame, substantially as specified.

7. A metallic side beam for a truck frame split or divided at its extremities where the pedestals are to be attached, substantially as and for the purpose set forth.

8. The combination of the truck frame, the springs supported thereon intermediate the pedestals, the bolster supported on said springs, and the guide pins rigidly connected to the bolster and playing through vertical guide opening, substantially as described.

9. The combination of the truck frame, a pair of elliptic springs one on each side of each side beam intermediate the wheels and each side beam suspended from said beams; with the bolster supported upon said springs, and the guide pins rigidly connected to said bolster, substantially as specified.

10. The combination of the truck frame, a pair of inverted U-shaped yokes suspended on the side beams thereof intermediate the wheels, the springs mounted on said yokes, the bolster supported on said springs, and the rigid guide pins attached to the bolster playing through guides on the frame to prevent lateral movement of the bolster, substantially as and for the purpose described.

11. The combination of the frame, the springs supported on the side beams thereof intermediate the wheels at each side of the truck, the bolster supported on said springs, and the side-bearing castings connected to the bolster, and the guide pins rigidly attached to said castings, all constructed substantially as described.

12. The combination of the truck frame, the pair of inverted U-shaped yokes suspended on the side beams thereof intermediate the wheels, the springs mounted on said yokes, the bolster supported on said springs, the side-bearing castings secured to the bolster, and the guide pins depending from said castings, substantially as specified.

13. The combination of the frame, the transverse tie bar suspended from the side beams thereof intermediate the wheels, the springs at the end of said tie bar beside each side beam; the bolster mounted on said springs, and the depending guide pins connected to said bolster, substantially as and for the purpose described.

14. The combination of the frame, the U-shaped yokes suspended from the side beams intermediate the wheels, the springs mounted on said yokes, the tie bar secured to said yokes, the bolster supported on said springs, the side-bearing castings connected to the ends of said bolster, and the depending guide

pins rigidly secured to said castings, all constructed and arranged to operate substantially as set forth.

15. For a truck frame a side beam composed of two bars *a, a*, set edgewise, bound together intermediate the wheels, but separated at the points where the pedestals are attached, substantially as and for the purpose described.

16. The combination with the side beams, of the end beams composed of two parallel flat bars laid flatwise, and the tie rods intermediate said bars, substantially as described.

17. The combination of the side beams each composed of two flat bars set edgewise, and bound together intermediate the pedestals, and separated at the pedestals; with the end beams composed of flat bars laid flatwise and the tie rods intermediate the members of the end beams and connected to the side beams, substantially as and for the purpose described.

18. For a truck frame a side beam composed of two bars *a, a*, set edgewise, bound together directly intermediate the wheels, but separated at the points where the pedestals are attached, in combination with the end beams, the pedestals, the bottom stays and corner braces, substantially as set forth.

19. The combination of the side beams each composed of two flat bars set edgewise and bound together intermediate the pedestals and separated at the pedestals; with the end beams composed of two flat bars laid flatwise, and the tie rods intermediate the members of the end beams and connected to the side beams, the pedestals, the bottom stays and corner braces, substantially as described.

20. The combination of the side and end beams, the pedestals attached to the side beams, the bottom stays intermediate the pedestals consisting of two parallel flat bars set edgewise and bolted to the legs of pedestals, the step castings secured between said bars, the motor suspension bar attached thereto and the cushioning springs on the bolts confining said suspension bars to said step castings, and the cushioning springs on said bolts, substantially as described.

21. The combination of the side and end beams, the pedestals attached to the side beams, the bottom stays intermediate the pedestals consisting of two parallel flat bars set edgewise; the stays connecting the jaws of pedestals and the flat braces between the pedestals and corners of truck frame, with the tie bar connecting the side beams intermediate the pedestals, the springs at each side of each side beam above the tie bar, the bolster mounted on said springs and the depending guide pins rigidly connected to said bolster, substantially as and for the purpose described.

22. The combination of the side beams each composed of two flat bars set edgewise, and bound together intermediate the pedestals, and separated at the pedestals; with the end beams composed of flat bars laid flatwise, and the tie rods intermediate the members of the end beams and connected to the side beams; with the tie bar connected to the side beam intermediate the pedestals where the members of the beams are bound together, the springs at each side of each side beam above said bar, the bolster mounted on said springs, and the guide pins rigidly connected to said bolster, all substantially as and for the purpose specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN TAYLOR.

Witnesses:

CORNELIUS J. EARLEY,  
JAMES H. MCGRAW.



No. 637,544.

Patented Nov. 21, 1899.

W. S. ADAMS.  
PIVOTAL CAR TRUCK.  
(Application filed May 27, 1899.)

(No Model.)

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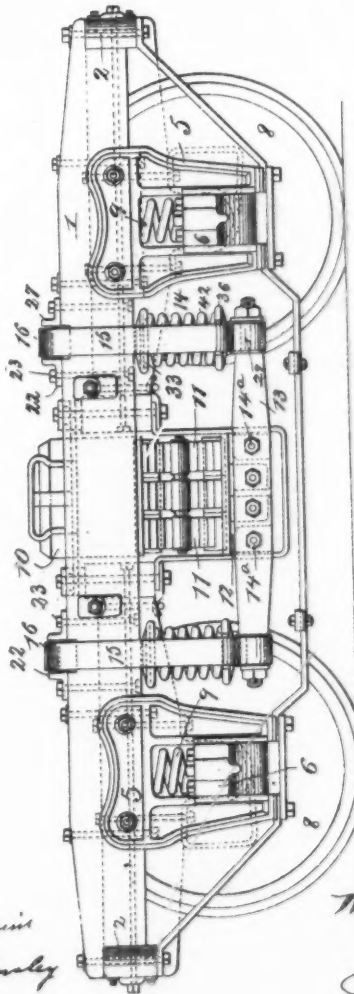


Fig. 1.

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No. 637,544.

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PIVOTAL CAR TRUCK.  
(Application filed May 27, 1899.)

5 Sheets—Sheet 2.

(No Model.)

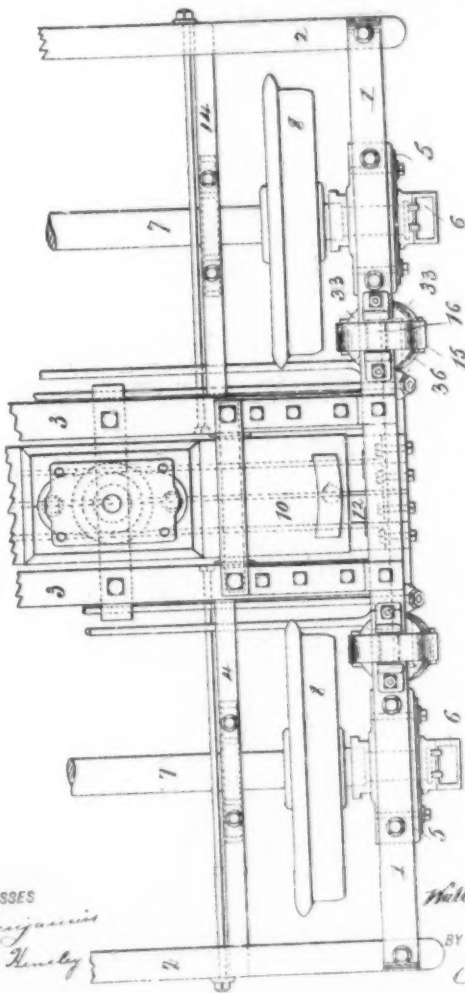


Fig. 2.

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No. 637,544.

Patented Nov. 21, 1899.

W. S. ADAMS.  
PIVOTAL CAR TRUCK.  
(Application filed May 27, 1899.)

(No Model.)

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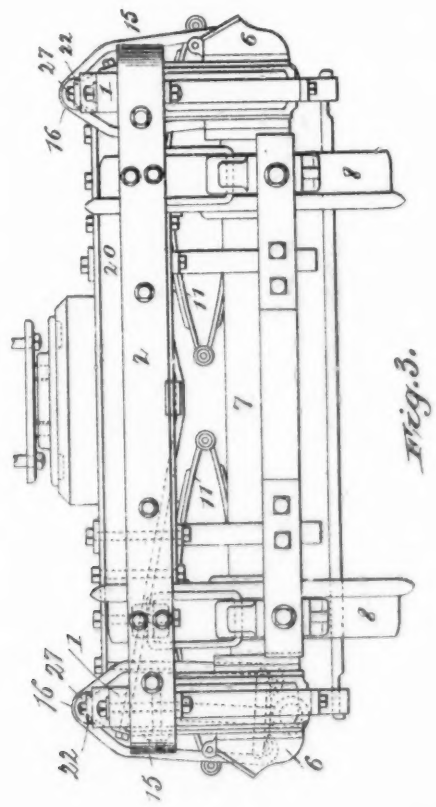


Fig. 3.

WITNESSES

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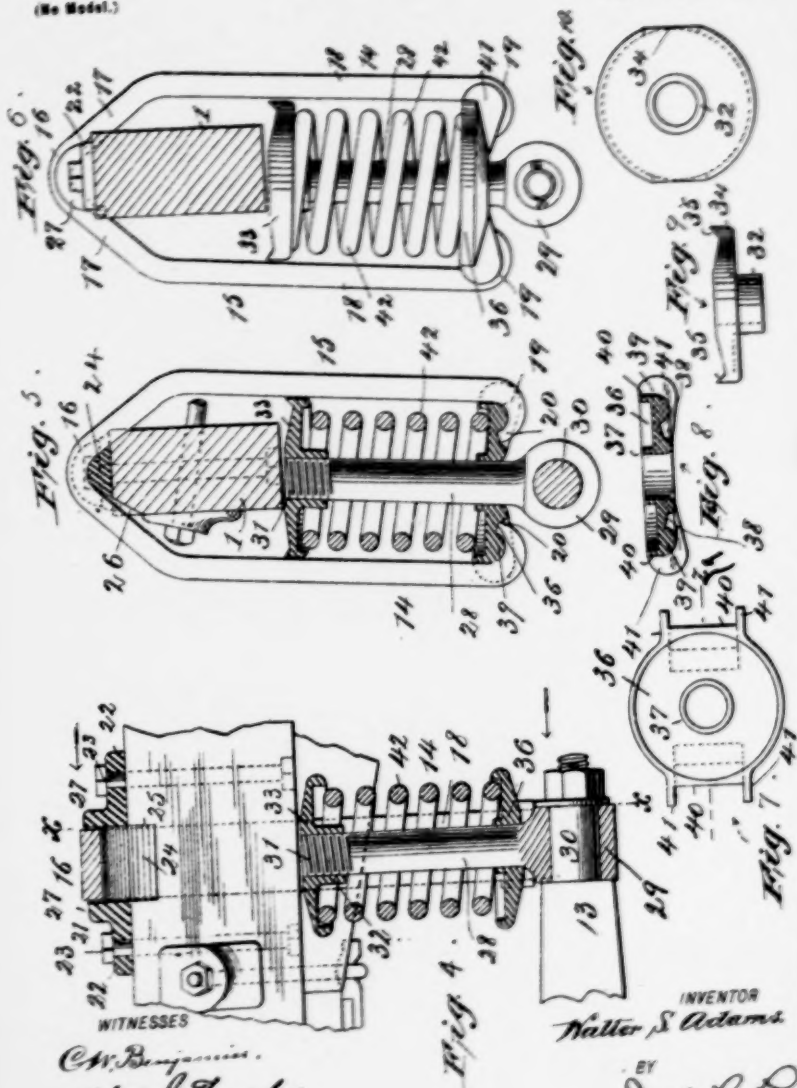
**No. 637,544.**

Patented Nov. 21, 1859.

W. S. ADAMS.  
PIVOTAL CAR TRUCK.  
(Application filed May 27, 1909.)

(No Model)

5 Sheets--Sheet 4.

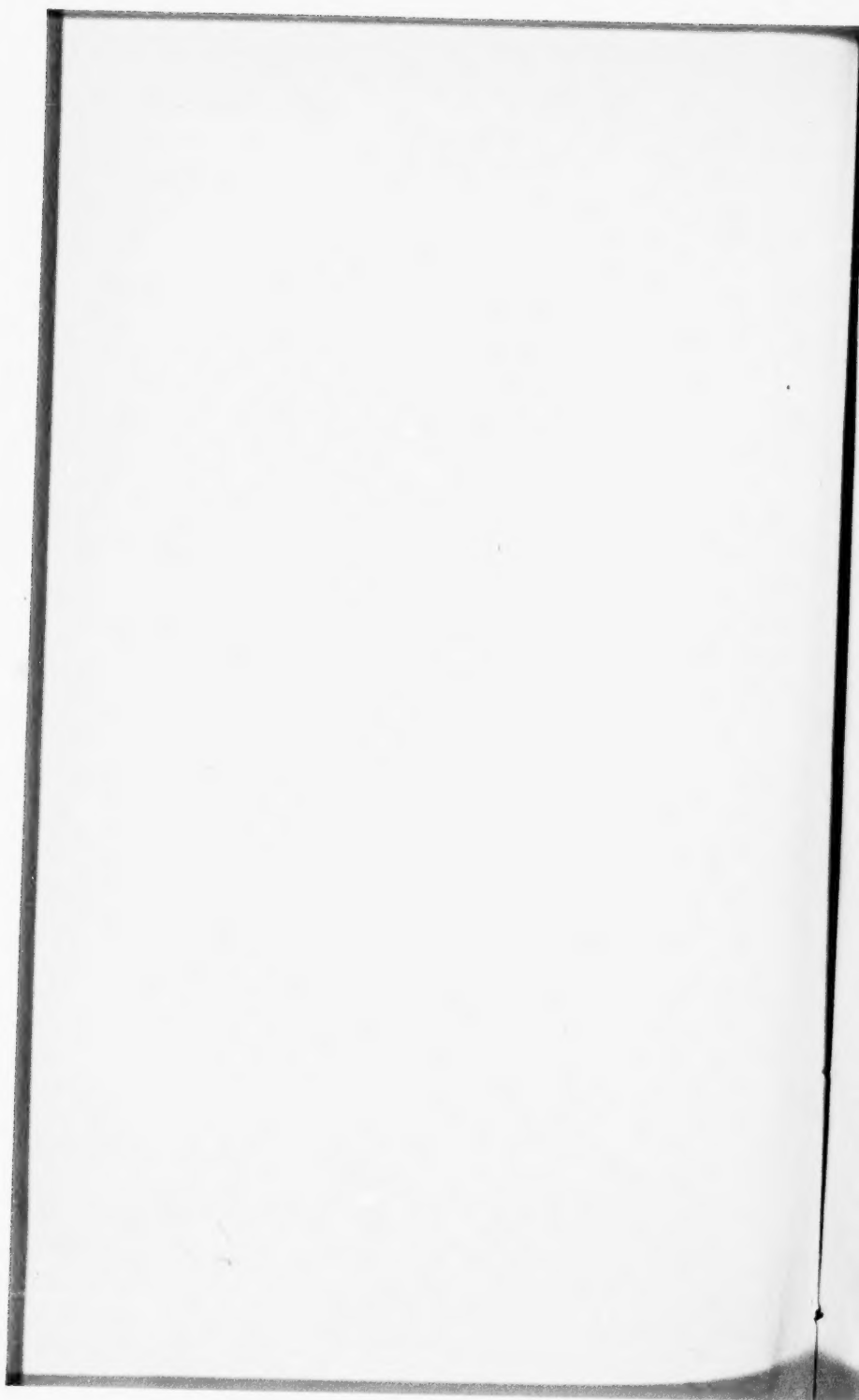


WITNESSES

Chas G Hurley

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Joseph L. Lewis  
ATTORNEY





No. 637,544.

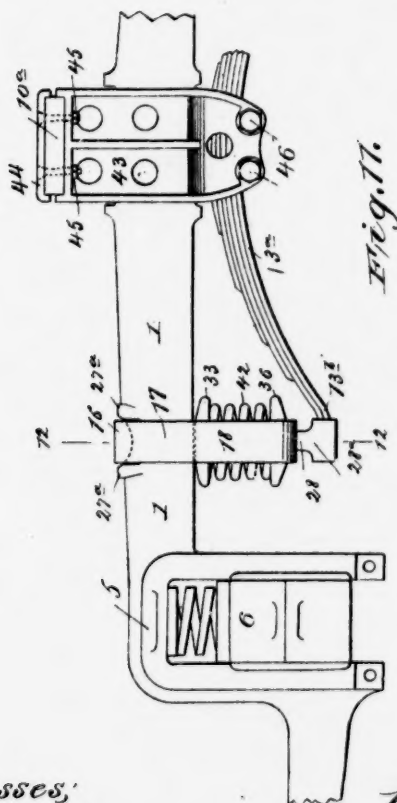
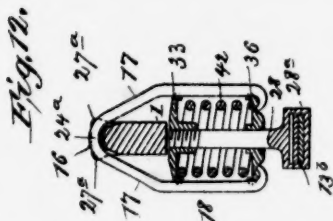
Patented Nov. 21, 1899.

W. S. ADAMS.  
PIVOTAL CAR TRUCK.

(Application filed May 27, 1899.)

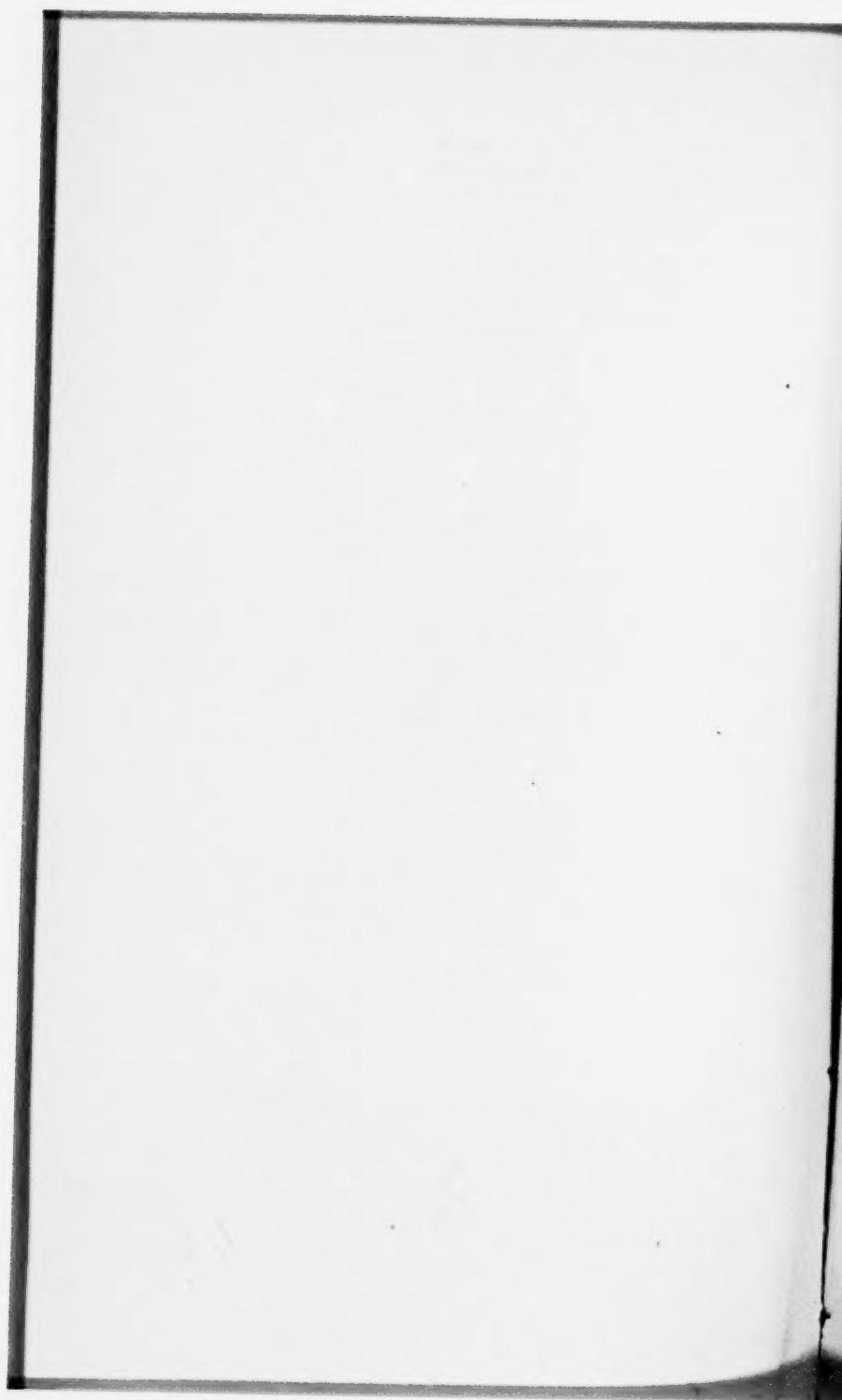
(No Model.)

5 Sheets—Sheet 5.



Witnesses,  
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Chas. S. Hurley

Inventor,  
Walter S. Adams  
by Joseph L. Hurley  
att'y



# UNITED STATES PATENT OFFICE.

WALTER S. ADAMS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
JOHN A. BRILL, OF SAME PLACE.

## PIVOTAL CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 637,844, dated November 21, 1899.

Application filed May 27, 1899. Serial No. 718,806. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. ADAMS, a citizen of the United States, residing in the city and county, of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Pivotal Car-Trucks, of which the following is a specification.

My invention has reference to improvements, hereinafter recited, in regard to car-trucks, more especially adapted for the purpose of passenger transportation, although the same may be advantageously employed in other relations.

My invention has relation to that class of truck in which an equalizing-bar, either in the form of a rigid and inflexible bar or a longitudinally-disposed semi-elliptic spring, is utilized for the purpose of suspending the bolster from the truck-frame in connection with links supported from the side bars of the truck-frame in which link-springs have been employed.

The constructions to which these improvements have special relation will be found in the patents to Brill and Curwen, Nos. 610,118 and 610,119, dated August 30, 1898, and also in the application for patent filed by George Martin Brill on the 3d day of July, 1897, Serial No. 643,339, Patent No. 627,898, dated June 27, 1899.

Among the many advantages derived from the constructions recited in the above patents and application is the longitudinal extension of the spring-base of the truck, affording considerable advantages in the equalization of the load upon the truck and the increase of the transverse spread of the bolster-support, which materially reduces and eases the transverse swing of the bolster, thereby materially increasing the stability of the car on the truck and causing the latter to ride with an ease and steadiness not heretofore accomplished in rolling-stock of that character.

In the constructions which have preceded my invention which relate more particularly to the construction of the link for the support of the equalizing mechanism, be they either a rigid bar or elliptic springs, the factors of safety, so far as the link-supports are concerned, depend entirely upon the stability of the pins or other means used for connecting

the links with the equalizers and the truck-frame. In my construction I increase this factor of safety by decreasing the number of parts liable to breakage or derangement—as, for example, in the patents to Brill and Curwen two pins or bars or like devices were used in the link construction, and in my present improvements I dispense entirely with the employment of one set of these pins. In other trucks of this class the equalizers have been supported from the side bars by links the upper ends of which have been pivotally secured by knuckle-joints in the upper portion of the side frames of the truck.

In all previous constructions a link-spring much shorter than the one employed in my present improvement was used owing to the necessary interposition of either the pivotal support of the link from the truck side frame or the top of the strap portion of the link in addition to the cap, which was placed upon the top of the link-springs, the result being that the length of the link and the radius of its swing was much smaller than is used in my present improvements. Therefore among the advantages of my present improvements is that a longer link can be used, so as to reduce the speed of the swing or vibration of the bolster, and a longer link-spring may be employed, so that many variations in the character of the link-springs may be employed to advantageously effect the spring-support of the car-body and their combination with the other truck-springs, and the number of connecting parts of the links with the truck-frame and the equalizers is reduced, so as to increase the factor of safety.

My invention therefore resides in the construction and in the combination of parts hereinbefore recited, and more fully pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a truck embodying my improvements; Fig. 2, a plan view of one-half of the truck or one side thereof; Fig. 3, an end view thereof. Fig. 4 is an enlarged sectional elevation, partly in section, of a portion of the side frame, one end of one of the equalizing-bars, and the link connections between the equalizing-bars and the truck-frame. Fig. 5 is a transverse

362, 363, 364, 365, 366  
Here follow diagram marked p.

sectional elevation of the same substantially on the line *x x*, Fig. 4, looking in the direction of the arrow. Fig. 6 is a like sectional elevation showing the links and allied parts in full. Fig. 7 is a plan view of the lower spring-cap; and Fig. 8 is a sectional elevation substantially on the line *z z*, Fig. 7. Figs. 9 and 10 are side and plan views, respectively, of the upper spring-cap. Fig. 11 is an enlarged side elevation of a portion of the side frame of another form of truck in which my improvements are applied to a semi-elliptic spring acting as an equalizer; and Fig. 12 is a sectional elevation on line *y y*, Fig. 1.

Similar numerals of reference indicate like parts throughout the several views.

The particular form of construction of the truck apart from the features recited in the claims constitute no part of my present invention, and the form of truck-frame or construction shown in either of the patents or applications heretofore referred to may be advantageously employed, if desired.

The particular form of truck in which I have embodied my improvements consists, substantially, as to the frame, of the side bars or wheel-pieces 1, connected at the ends by the cross-bars 2 and centrally by the bolster-transoms 3, supplemental or inside wheel-pieces 4 being shown as extending between the transoms and end cross-bars, the pedestals 5 of usual or desired form being secured to the wheel-pieces in which are the axle-boxes 6 for the axles 7 and the wheels 8, and the pedestals are the usual springs or cushions 9, which springs may be specially designed for the purpose of entering into the spring-support of the car-body, as recited in the patents and applications heretofore referred to. Pedestal tie-bars and braces and cross-bars and truss-rods are shown employed in the conventional manner; but, as heretofore stated, this particular kind of truck construction forms no part of my present invention, and I do not therefore describe it in detail.

At 10 is the bolster, 11 the bolster-springs, and 12 the sand-plank. The sand-plank, or "spring-plank," as it is sometimes called, is secured in the construction shown in Figs. 1, 2, and 3 to the equalizing-bars 13 by bolts 14, the plank being of any desired form. The equalizing-bar, which in the form as shown in Fig. 1, &c., is a solid bar longitudinally-disposed substantially under the side bars 1 on each side and to which the sand-plank is secured, as shown in Figs. 1 and 2, or in any other desired way, in which the ends of the cross-bars forming the sand-plank are angularly disposed and bolted to the equalizing-bar, or said equalizers may take the form shown in Figs. 11 and 12, in which a semi-elliptic spring is employed, which spring supports the yokes embracing and extending above the side bars, which yokes are tied transversely by and support the bolster, the latter construction eliminating the intermediate

spring-plank and the bolster-springs. In all of the previously-recited constructions considerable scope of variation is allowed to the constructor, as any one of these forms or any other suitable form can be utilized without departing from my invention.

At 14 are the links, constructed so as to be telescopic, or, in other words, extensible in the direction of their length, the links being in two parts, one part engaging directly with the equalizers and the other part (the upper) passing directly over and embracing the wheel-pieces, side bar, or upper chord of the truck frame, whatever that particular part may be termed and between which parts the link-springs are interposed, as hereinafter described. The upper portion of the link 14 comprises the yoke or strap 15, which, as shown in Figs. 5 and 6, embraces the wheel-piece or side bar 1, the strap being preferably formed of a piece of bar-iron discontinuous between its lower ends and brought together at the top 16 by the upwardly-converging portions 17 to form a pivoting-head, the side portions or bars 18 of the strap being distended to allow free movement about the side bar 1 and to receive the lower section of the link, the ends 19 of the strap being turned inwardly and reduced in diameter to form engaging lips 20.

Each side bar 1 is provided adjacent each pedestal with a block 21, having side flanges 22, through which bolts 23 pass, by which said block is secured to the wheel-pieces 1, and a central pivot-block 24, triangular in cross-section, Fig. 5, and which is rounded at its apex to form a bearing for the bearing-head 16 of the strap, the wheel-piece being recessed, as at 25, to allow of the pivot-block 24 being set down therein to give it a firm bearing, the wheel-piece being cut away, as at 26, to provide for the swing of the strap, the flanges of the block 24, having lips 27, rising up above the pivoting-block, so as to receive the head 16 of the strap between them, as shown in Fig. 4, and prevent displacement of the link.

The lower section of the link comprises the rod or plunger 28, provided with an apertured eye or enlargement 29 at its ends to engage the journal end 30 of the equalizing-bar 13, as shown in Fig. 4, the upper portion of the bolt or thrust bar being screw-threaded at 31 to receive the apertured and threaded hub 32 of a cap or follower 33. The cap or follower is recessed in its lower face to form a spring-cap and its sides are squared at 34 and provided with lips 35 to form guides in conjunction with the side pieces 16 of the strap to prevent rotation of the plunger therein.

The lower ends 19 of the strap detachably support a spring-cup 36, having an apertured hub 37, through which the bolt or thrust bar 28 passes, as shown in Fig. 5, the upper face of the cup being recessed. The lower face of the cup is provided with recesses 38 at each side of the apertured hub 37 to receive the lips 20 of the strap, and at each side of these recesses are outwardly-extending ears 41,

which receive the side bars 18 of the strap between them, rounded lugs 39 being formed between the recesses and the edge of the cup to rest in the cavity of the strap ends 19, the edge of the cup being squared, as at 40, to receive the straight sides of the side pieces 18 of the strap, thereby providing an interlocking joint between the spring-cup 36 and the strap ends 19, preventing the cup from becoming detached horizontally, means whereby the cup can be readily attached or detached from the strap, and a firm and stable support for the link-springs.

Between the cap and the cup and about the thrust-bar are located the link-springs 42, preferably spiral springs, as shown. These link-springs in their normal condition separate the cap 33 and cup 36; but under the stress of load the link-springs are compressed, the load being primarily taken upon the bolster-springs 11 when they are employed, thence to the link-springs 42, through the equalizing-bars to the side frames of the truck, through the axle-box springs 9, if they are employed, and thence to the axle-boxes and axles, &c.

It will be clearly noted from Figs. 4, 5, and 6 that the link comprising both of its parts, which are extensible or depressible in the direction of their length, can swing bodily from a point above the side frames of the truck and that the support of the bolster on the side frame is further articulated through the journaled connection of the equalizing-bars with the thrust-bar 28. In order to provide for stability of the support of the bolster on the truck, the links 14 are splayed outwardly, as indicated in Figs. 5 and 6.

Instead of the pivot being formed of a separate casting, as shown herein, it can be formed on the side bar itself, when the same is made of metal, as shown in Figs. 11 and 12. In this construction a spring-plank, the bolster supported on the spring-plank, and inflexible equalizing-bars are omitted, and in their place yokes 43 are provided, which extend upwardly above and embrace the side bars 1 and downwardly below the side bars are supported by the longitudinally-disposed upturned semi-elliptic springs 13\*, all generally or specifically in manner as shown in the application of John A. Brill, filed May 15, 1899, Serial No. 716,884, the side bars 1, pedestals 5, &c., being of metal.

Instead of using the block or castings 21 the pivot-head is formed on the side bar 1 adjacent to pedestals, as at 24\*, (preferably with a longitudinally-curved seat, as shown, to allow of a longitudinal swing of the links when the spring 38 spreads,) and the strap is restrained from longitudinal displacement by the integrally-formed lips 27\*. The plunger or thrust bar 28 instead of being pivoted to the journal end 30 of the equalizing-bars 13 is formed with a rectangular-shaped block or housing 28\*, having a longitudinal aperture in which the ends 13\* of the semi-elliptic

springs are received. The links otherwise are constructed as previously described. The construction shown in Figs. 11 and 12 may be employed in many cases where the previously-described construction, by reason of cost or otherwise, may be undesirable, the semi-elliptic springs 13\* not only taking the place of the usual bolster-springs, but that of the equalizing-bars 13 as well.

The yokes or saddles 43 which embrace the side bars 1 are tied together transversely by the flat bolster-bar 10\*, on the ends of which are secured the side bearings 44 by bolts 45, which bolts secure the yokes or saddles, the bolster 10\*, and the side bearings 44 together, the opposing yokes 43 (there being one on each side of each bar 1) and the springs 13 being secured together by the bolts 46.

By means of either of the foregoing constructions an exceedingly easily-riding truck is produced. The support of the bolster is had at a point preferably closely adjacent the axles through the medium of the links, so that the longitudinal spread of the bolster-support is increased and the weight more evenly distributed on the axles. Means are provided whereby the lifting of either end of the truck when braking is prevented through the interposition of the link-springs. The transverse spread or spring-support for the bolster is increased, so that the swing of the bolster will be slower. The point of suspension of the links is on or above the side frames, so that a long link, producing a long slow swing is obtained, the construction of the link allowing of the employment of a long link-spring, and by means of the special construction of link and through so disposing it that it embraces the side bar or side frame the factors of safety are increased by decreasing the number of parts therein which are liable to breakage or separation, the prominent feature of the specific construction of the link being that no connecting-pins ordinarily subjected to a shearing strain are employed.

I desire it to be understood that where the word "equalizer" or equivalent expression is employed in the claims either the equalizing-bars, the semi-elliptic springs, or other equivalent construction is included therein.

Having described my invention, I claim—

1. The combination in a car-truck, of side frames having axle-box pedestals and side bars connecting the pedestals, axle-boxes in the pedestals, a bolster, longitudinally-disposed equalizers supporting the bolster, links and spring-supports therefor suspended from and embracing the side bars and supporting the equalizers, substantially as described.

2. The combination in a car-truck, of the side frames each comprising a side bar and pedestals, longitudinally-disposed equalizers arranged below the side bars, a bolster supported by said equalizers, appliances connected to the ends of the equalizers and pivotally supporting them from and embracing the side bars, and spiral springs coacting with

said appliances by which said equalizers are suspended, substantially as described.

3. The combination in a car-truck of side bars, a bolster, longitudinally-disposed equalizers supporting the bolster, inverted-U-shaped and paired links pivotally supported at their upper ends on and embracing the side bars, a spring-plate supported at the lower end of each of the links, a spring on the plate, a follower on the spring, and means for connecting the followers of each pair of links with said equalizers, substantially as described.

4. The combination in a car-truck of side bars, a bolster, longitudinally-disposed equalizers supporting the bolster, inverted-U-shaped and paired links having open lower ends, said links being pivotally supported at their upper ends on the side bars, a spring-plate detachably supported on and at said open ends, a spring on the plate, a follower on the spring, and means for connecting the followers of each pair of links with said equalizers, substantially as described.

5. The combination in a car-truck, of side bars, a bolster, longitudinally-disposed equalizers supporting the bolster, inverted-U-shaped and paired links having lower open ends, said links being pivotally supported at their upper ends on the side bars, a perforated spring-plate detachably supported by and at said open ends a spring on the plate, a follower on the spring, and a plunger connecting the follower with the end of the equalizer and passing through the plate, substantially as described.

6. The combination in a car-truck, of the side frames, springs suspended from the side frames by straps which embrace said frames and are pivotally supported thereon, longitudinally-disposed equalizers suspended by said springs, and a cross-bolster resting on said equalizers, substantially as described.

7. The combination in a car-truck, and the side frames, of the equalizers movably and resiliently suspended from the side frames by devices which embrace the said frames and which are pivotally supported thereon, and a bolster secured to said equalizers, substantially as described.

8. The combination in a car-truck, of the truck-frame, spring-links depending from the truck-frame, which links embrace and are pivotally supported upon the side frames of said truck-frame, longitudinally-disposed equalizers connecting the links, and means for connecting said equalizers with the car-body, substantially as described.

9. The combination in a car-truck and its running-gear, of the side frames supported outside of the wheel-gage, extensible spring-links depending from the side frames and supported therefrom by means which embrace the side frames and which means are pivotally supported thereon, longitudinally-disposed

equalizers supported by said links, and a bolster on and transversely connecting said equalizers, substantially as described.

10. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper longitudinal side bar, longitudinally-disposed equalizers suspended below said side bars, a spring suspension for the ends of said equalizers from the side bars, said spring suspension including a strap link-section embracing and which is pivotally supported on the side bars, and a bolster supported on said equalizers and tying them together, transversely, substantially as described.

11. In a car-truck, the combination with the side frames having axle-box pedestals, the bolster, longitudinally-disposed equalizing-supports for the bolster and resilient connections between the ends of said supports and the side frames, said resilient connections including a strap link-section pivotally supported on the side frames and embracing them, substantially as described.

12. The combination in a car-truck, of the side frames comprising pedestals, side bars between the pedestals, axle-boxes in the pedestals, springs between the axle-boxes and the tops of the pedestals, a bolster, equalizers supporting a bolster, and spring-supporting links which embrace the side bars and are supported therefrom at their upper ends, substantially as described.

13. In a car-truck, the combination with the side frames, each comprising two pedestals, side bars connecting the pedestals, a car-body-supporting bolster, equalizers supporting said bolster and located below the side bars and appliances for suspending said equalizers comprising a link having a strap link upper section embracing each of the side bars and pivotally supported thereon, substantially as described.

14. In a car-truck, the combination with the side frames, each comprising two pedestals, side bars connecting the pedestals, of a car-body-supporting bolster, equalizers located below said side bars, and link appliances secured to the ends of said equalizers embracing the side bars and movably suspended on the top of said side bars, substantially as described.

15. In a car-truck, the combination with the side frames, each comprising two pedestals, side bars connecting the pedestals, of a car-body-supporting bolster, equalizers connected to the ends of said bolster and supporting the same, and elastic link appliances secured to the ends of said equalizers embracing the side bars and suspended from the top of the same, substantially as described.

16. In a car-truck, the combination with the side frames, each comprising two pedestals, the side bars connecting the pedestals, of a car-body-supporting bolster, equalizers upon

which the ends of said bolsters rest, and links suspended from above the side bars and supporting the ends of said equalizers for the purpose of permitting lateral displacement of said springs with relation to the side frames, said links in part embracing the side bars, substantially as described.

17. In a car-truck, the combination with the side frames, each comprising two pedestals and a side bar, of a car-body-supporting bolster, and spring-actuated appliances on which the ends of the bolster rest, said appliances embracing the side bars and which are suspended thereon above the bottom of said side bars, substantially as described.

18. In a car-truck, the combination with the side frames, each comprising two pedestals and a connecting side bar, of a car-body-supporting bolster, equalizers upon which the ends of said bolsters rest and suspending appliances for the ends of said equalizers, one portion of which suspending appliances embraces the side bars, and which are pivotally supported on and within the plane of the sides of the side bars, substantially as described.

19. In a car-truck, the combination with the side frames, of a car-body-supporting bolster elastically suspended from the side bars of said frames by appliances which embrace the sides of said side bars and permit said bolster to move transversely with reference to the side frames, substantially as described.

20. In a car-truck, the combination with the side frames, of a car-body-supporting bolster suspended from said side frames by appliances which embrace the element of the side frames which support it and which permit it to move transversely with reference to said side frames, and elastic appliances for yieldingly resisting such movement, substantially as described.

21. In a car-truck, the combination with the side frames, each comprising two pedestals, side bars connecting the pedestals, of a pair of transoms arranged transversely of the truck-frame and secured to the side bars, the car-body-supporting bolster arranged to operate between said transoms, equalizers supporting said bolster and located below the side bars and suspending appliances connected to the ends of said equalizers and to the side bars, one element of said suspending appliances embracing the side bars and being constructed to swing transversely of the truck, substantially as described.

22. The combination in a car-truck, of side frames comprising pedestals and connecting side bars, axle-boxes in the pedestals, a bolster, equalizers disposed below the side bars and supporting the bolster, links, the upper element of which embraces the side bar, springs on the upper link element for supporting the lower link element, the lower link element being connected to the equalizers, substantially as described.

23. The combination in a car-truck, of side frames, each comprising upper and lower longitudinal bars and pedestals, equalizers arranged below the top side bars, a bolster supported thereby, the ends of the equalizers being supported from the side bars by spring-equipped appliances, a portion of which embraces and which is pivotally mounted on the side bars, substantially as described.

24. The combination in a car-truck, of the side frames, each comprising side bars and pedestals, equalizers arranged beneath the side bars, a bolster supported by the equalizers, and appliances connected to the ends of said equalizers and supporting them from the side bars, said appliances being pivotally supported from and embracing the side bars, and spiral springs coacting with said appliances by which the said equalizers are suspended, substantially as described.

25. The combination in a car-truck, of side frames, each comprising side bars and pedestals with equalizers arranged beneath the side bars, the car-body-supporting bolster supported by said equalizers and adapted to carry the weight of the car-body at its center, the ends of said equalizers being suspended from the side bars by spring-equipped appliances, said appliances, embracing the side bars and which are pivotally supported thereon, substantially as described.

26. In a car-truck, the combination with a bolster, transversely-disposed equalizers supporting the bolster, and links suspending the equalizers from the truck-frame, each comprising a lower section secured to the respective ends of the equalizers, and an upper section embracing its respective truck side bar and a compression-spring interposed between the upper and lower link elements, substantially as described.

27. The combination with the side bars, bolster and equalizers, of the link comprising the upper strap link-section, a pivot-block on the side bars interposed between the latter and the strap, an apertured spring-seat detachably connected to the lower ends of the strap-section, a bolt passing through said aperture and carrying at its upper ends a follower lying between the sides of the strap and having at its lower end means for connecting it to the equalizers, and a spring surrounding said bolt and extending between said seat and follower, substantially as described.

28. The combination, in a car-truck, of the side bars, the bolster, and equalizers supporting the bolster, of link-supports for the equalizers comprising an upper strap-section continuous except at its lower horizontal portion, a spring-seat detachably supported upon the said lower horizontal portion, the upper portion of the strap being pivotally supported on the side bars, a bolt passing through said spring-seat and carrying a follower within the strap, a spring inserted between the follower



and the spring-seat, and means for connecting the equalizers with the lower end of the bolt, substantially as described.

29. The combination with the strap having 5  
inturned ends or lips, and a spring-seat having recesses for receiving said ends or lips, substantially as described.

30. The combination with the bars of the strap, the lower termini of which are turned 10  
inwardly to form lips, and the spring-seat having recesses to receive said lips, and outwardly-extending lips embracing the sides of the straps, substantially as described.

31. The combination of the side bars having 15  
a pivot-block, of the strap link-section embracing the side bar, the upper portion of said link being supported on said pivot-block, said link diverging outwardly from its point of pivotal support and downwardly and embracing the side bar, a spring embraced within 20  
said strap and supported thereby, a follower on the spring in the strap, a bolt secured to the follower and extending through the spring and strap, substantially as described.

32. The combination with the side bar of a 25  
truck-frame, of the link-section comprising the strap having upwardly-converging portions forming an angular bearing and depending side portions, an angular pivot-block 30  
on the side bar to receive said angular bearing, a spring supported by said strap, a bolt supported on the said spring, and ear-supporting means connected with said spring, substantially as described.

33. The link-section comprising the strap 35  
having upwardly-converging portions forming an angular bearing, the angular pivot-block having upwardly-extending lips bearing against the sides of the converging portions of the strap, a spring supported within 40

the side bars of the strap, a follower on said spring, and a bolt secured to said follower, substantially as described.

34. The combination with the side bar of the pivot-block having flanges bolted to the side bar, upwardly-extending lips on the pivot-block, the angular pivot-block below and between the lips, the link-strap having upwardly-converging sections forming an angular bearing resting on the bearing-block, the 45  
pendent side portions of the strap, the spring suspended by and within said side portions, a follower on the spring, and a bolt on the follower, substantially as described. 50

35. The combination with the spring-cup 55  
having the recesses 38 and rounded lugs 39, of the side bar 1, the strap 15 pivotally supported on the side bar, the said strap having rounded ends 19 ending in lips 20, the rounded 60  
ends engaging the lugs 39, the lips engaging the recesses, a spring on the cup, a cap or follower on the spring, a bolster, and means for connecting the cap with said bolster, substantially as described. 65

36. The combination in a car-truck, of the 65  
side bar, a strap 15 pivotally supported from the side bar, the spring-cup detachably supported on said strap, means for preventing displacement of said cup thereon, a bolster, and means for resiliently connecting the 70  
spring-cup and bolster together, substantially as described.

Signed at the city and county of Philadelphia, State of Pennsylvania, this 8th day of May, 1899.

WALTER S. ADAMS.

Witnesses:

FRANCIS RAWLE, Jr.,  
HENRY C. ESLING.



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## DEFENDANT'S EXHIBITS.

*Letters from the File Wrapper of Brill's Secondary Patent, No. 627,900.*

2-246.

Room No. 98.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

All communications rerespecting this application should give the serial number, date of filing, and title of invention.

L. M. S.

DEPARTMENT OF THE INTERIOR, E. P. H.  
UNITED STATES PATENT OFFICE,  
WASHINGTON, D. C., Dec. 7, 1897.  
Mailed " " "

George M. Brill, care Jos. L. Levy, 206 Broadway, New York, N. Y.:

Please find below a communication from the Examiner in charge of your application for Car Truck, filed Nov. 9, 1897, Serial No. 657,070.

BENJ. BUTTERWORTH,  
C. H. DUELL,  
*Commissioner of Patents.*

Claim 1 is rejected on patent No. 4,276, Thyng, Nov. 18, 1845 (Trucks Four Wheels, Bogies).

Claim 4 appears to be misdescriptive in setting up that the bolt is articulated between its members. Reference to the specification, page 5, beginning with the top, sets forth that the link embodies the upper and lower bolts 26 and 27, then describes specifically each of the bolts. Correction is required.

Claim 8 is indefinite and uncertain in scope. The car body supporting bolster is pivotally and elastically suspended from the truck frames by the links with their springs, and applicant sets forth further springs for supporting said elastic suspension of the bolster. What springs are meant?

The words "enlarged and" should be erased from line 3, claim 12.

The criticism made in connection with claim 4, applies as well to claims 13 and 14, and correction is required. Claim

13 appears to be unwarranted by the construction illustrated and described, inasmuch as no "cross-beam supported by said connections, one or more springs thereon," are found in this application.

The cup shaped washers mentioned on line 4, claim 14, are not referred to by such name in the specification. Correction is required.

Applicant states that this is a divisional application of another filed by him on July 3, 1897, Serial No. 643,339.

Claims 15, 16 and 17 do not appear to set forth clearly the line of division inasmuch as claims to this structure are made both in this application and the one above referred to. Correction is required.

G. R. SIMPSON,  
*Examiner, Div. 34.*

L. M. S.

Room 98.

In the Matter of the Application of George M. Brill for Car Trucks.  
Filed November 9th, 1897. Serial No. 657,970.

Hon. Commissioner of Patents.

SIR: Amend above case as follows:

Cancel claim 1.

Claim 4, erase —members—, 2nd line, and insert the word —ends—.

Claim 8, which is the first claim of amendment dated November 9th, 1897, cancel and substitute:

7. In a car truck, the combination with the side frames, of a car body supporting bolster, pivotal supports for the bolster depending from the truck frame, a resilient element directly secured to the bolster, and springs for supporting said resilient element through said links, substantially as described.

B, Erased Mar. 25, '98.

Claim 13, which is the 6th claim of the above amendment, cancel and substitute:

13 11. In a car truck, the combination with the side frames, of the upper link bolts pivoted to said frame, lower link bolts having eyes to which the upper bolts are pivoted, connections through which the lower bolts extend, springs on the lower bolts, below said connections, whereby the connections are elastically supported, and a car supporting bolster on said connections, substantially as described.

B<sup>1</sup>, Erased May 19, '99.

375 Claim 14, cancel and substitute:

12 13. In a car truck, the combination with the side frames, of the upper link bolts pivoted to said frames, lower bolts having eyes to which the upper bolts are pivoted, connections through which the lower bolts extend, spiral springs on the lower bolts below said connections, cups against which the spiral springs press, and a car supporting bolster suitably supported on said connections, substantially as described.

B<sup>2</sup>.

Claim 15, cancel and substitute:

14 13. In a car truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally disposed semi-elliptic springs secured to the lower end of said bolts, a cross bolster resting on said springs, and further springs included

in the link suspension of said semi-elliptic springs, substantially as described.

B<sup>3</sup>, Erased May 19, '99.

Claim 16, cancel and substitute:

14 15. In a car truck, the combination with the side frames, of the cross bolster suspended below the side frames by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together, and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

B<sup>4</sup>.

Claim 17, cancel and substitute:

11 15. In a car truck, the combination with the side frames, of the cross bolster suspended below the frames by semi-elliptic springs and articulated and pivotal links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

B<sup>5</sup>.

Claim 18, cancel and substitute:

16 17. The combination with the side bar having a conical opening therein, a bolt, a thread formed on the bolt, a ball on the  
376 bolt engaging the thread, a seat in the opening for the ball, a spring supported by the bolt, and a bolster supported on said spring through an intermediate connection, substantially as described.

B<sup>6</sup>, Erased May 19, '99. Insert C, Apr. 21, '99.

#### *Argument.*

The above amendment, it is considered, avoids the objections raised.

As to claims 15, 16, 17, 18, they are now drawn to cover the species of this case.

A reconsideration and allowance is respectfully requested.

Respectfully,

JOSEPH L. LEVY, *Attorney.*

New York, December 9th, 1897.

2-246.

Room No. 98.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

All communications respecting this application should give the serial number, date of filing, and title of invention.

L. M. S.

DEPARTMENT OF THE INTERIOR, E. P. H.  
UNITED STATES PATENT OFFICE,  
WASHINGTON, D. C., Dec. 28, 1897.  
Mailed " " "

Geo. M. Brill, care Jos. L. Levy, 206 Broadway, New York, N. Y.:  
Please find below a communication from the Examiner in charge

of your application for Car Truck. filed Nov. 9, 1897. Serial No. 657,970.

BENJ. BUTTERWORTH,  
C. H. DUELL,  
*Commissioner of Patents.*

377      Claims 1, 3, 4, 5, 7, 9, 10, 12, 13, 14, 15 and 16 are all rejected in the patent to Thyng, of record, in view of patent No. 330,023, Nov. 10, 1885. Haskins, (Carriages & Wagons, Springs, Side Bar, Cross), no invention being involved in the substitution of the spring link shown by Haskins for the Universal link in the patent of Thyng.

G. L. WILKINSON,  
*Act'g Examiner, Div. 34.*

L. M. S.

Room 98.

In the Matter of the Application of George M. Brill for Car Trucks.  
Filed November 9th, 1897. Serial No. 657,970.

Hon. Commissioner of Patents.

SIR: Amend above case as follows:

**Specification.**

Page 4, line 14, erase —articulating— and insert —articulated—.

**Claims.**

Claim 11, line 3, erase —an enlarged and— and insert —a—. Cancel claim 7.

**Memo.**

Claim 1. The specific relation of elements recited in the claim cannot be made by any permissible arrangement of the elements of the references.

Claim 3. The same remarks are made, and the Examiner is requested to point out the pertinent parts from both references, and how they can be combined to meet the claim.

Claims 4 and 5. The same remarks are made, and it is requested that the Examiner show how he would arrange the Haskins springs on the Thyng truck to produce the combinations of these claims.

The same remarks are made in regard to the balance of the claims rejected upon the patents to Thyng and Haskins.

A reconsideration is respectfully requested.

**Respectfully,**

JOSEPH L. LEVY, *Attorney.*

New York, March 24th, 1898.

2-246.

Room No. 98.

All communications should be addressed to "The Commissioner of Patents, Washington, D. C."

All communications respecting this application should give serial number, date of filing, and title of invention.

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DEPARTMENT OF THE INTERIOR, E. P. H.  
UNITED STATES PATENT OFFICE,  
WASHINGTON, D. C., April 15, 1898.  
Mailed " " "

George M. Brill, care Jos. L. Levy, 206 Broadway, New York, N. Y.:

Please find below a communication from the Examiner in charge of your application for Car Truck, filed Nov. 9, 1897. Serial No. 657,970.

C. H. DUELL,  
*Commissioner of Patents.*

Claims 3, 4 and 5 are rejected on the patent to Haskins, of record. It will be noted that every element in each of these claims is found distinctly illustrated in figure 3 of the reference. The clip E of said figure 3 is considered the full equivalent of the upper link bolt mentioned in claims 4 and 5. The said clip together with the bolt *d* are considered to be the full equivalent of the articulated bolt mentioned in claim 3.

Claims 7, 8, 10, 11 and 12 are also rejected on the patent to Haskins, for the reasons above noted, or on patent No. 595,045, Cooke, Dec. 7, 1897 (Trucks, Electric Motors, Bogies), the application for which was filed Mar. 2, 1897. Serial —.

G. R. SIMPSON.

L. M. S.

In the United States Circuit Court of Appeals for the Third Circuit.

THE NORTH JERSEY STREET RAILWAY COMPANY, Appellant,  
vs.  
JOHN A. BRILL, Appellee.

Appeal from the Circuit Court of the United States for the District of New Jersey.

Before Acheson, Dallas, and Gray, Circuit Judges.

ACHESON, *Circuit Judge*:

This suit was brought for the alleged infringement of two letters patent No. 627,898 and No. 627,900, both granted on June 27, 1899 to George N. Brill, who assigned them to the complainant. The latter of the two patents is divisional in its relation to the former.

The original application was filed July 3, 1897, and the divisional application November 9, 1897. Both patents relate to improvements "in car trucks generally," but especially to trucks employed in passenger service in connection with electric propulsion." The specification of patent No. 627,898 describes the various parts of 379 the truck, and ends with one hundred and eleven (111) claims. Patent No. 627,900, has nineteen (19) claims. Thus the combined claims of the two patents numbered one hundred and thirty (130).

The claims of patent No. 627,898 involved in this appeal are as follows:

"6. The combination of a truck having a frame, springs supported by said frame, hangers movably supported on said springs, semi-elliptic springs connecting said hangers, and means for supporting a car-body on the truck connected with said semi-elliptic springs, substantially as described.

"10. The combination of a car-truck, of the truck frame, spring-links depending from the truck frame, semi-elliptic springs connecting the links, and means for connecting said latter springs with the car-body, substantially as described.

"11. The combination in a car-truck, of the truck-frame, transversely-swinging spring-links depending from the truck frame, semi-elliptic springs connecting said links, and a bolster having car-connecting means on said latter springs, said bolster being fixed-secured to said springs and swinging in unison therewith, substantially as described.

"13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.

"14. In a car-truck, the combination with the side frames having axle-box pedestals, the longitudinally-disposed semi-elliptic springs, extensible and resilient connections between the ends of the said springs and the side frames at or near said pedestals, and a bolster secured to said springs, substantially as described.

"15. In a car truck, the combination with the side frames having axle-box pedestals, the bolster, longitudinally-disposed resilient supports for the bolster, and resilient connections between the ends of said supports and the side frames, substantially as described.

"30. In a car-truck, the combination with the side frames, of the longitudinal leaf-springs, a bolster tying said springs together, links pendent from the truck frame and adapted to move perpendicularly relatively to said frame, the ends of said springs resting on said links, and further springs adapted to resist the downward movement of the links, substantially as described."

"80. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross bolster secured to said semi-elliptic springs, links suspended from the side bars and attached to said springs, and further springs combined with said links adapted to oppose the motion of the side frames or the semi-elliptic springs, substantially as described."

"81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames, and connecting the ends of the semi-elliptic springs with the side frames, substantially as described."

380 "87. In a car-truck, the combination with the side frames of a car-body supporting bolster, pivotal supports for the bolster depending from the truck-frame, a resilient element directly secured to the bolster and springs for supporting said resilient element through said pivotal supports, substantially as described."

The claims of patent No. 627,900 here involved are as follows:

"13. In a car-truck, the combination with the side-frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frame, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs and further springs included in the link suspension of said semi-elliptic springs, substantially as described."

17. The combination in a car-truck having an upper chord, of the longitudinally disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

In the opinion filed by the learned Judge below he states that "it is only necessary to consider claim 13," adding that "it is admitted on the part of the complainant that unless this suit can be maintained with respect to that claim, it cannot be maintained as to any of the claims of patent No. 627,898." For convenience we here again quote that claim:

"13. The combination in a car-truck of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described."

The main question in the case is, whether this combination was patentable at the time of Brill's alleged invention.

Under the proofs it is very clear that the art of truck construction, whether relating to car trucks generally, or to trucks employed in passenger service in connection with electric propulsion, was old and in a highly advanced state at the time Brill made these patented improvements.

The earliest patent which this record exhibits, namely, the patent to Thyng, No. 4,276, dated November 18, 1845, shows a four-wheel swing-bolster, pivotal car-truck. The bolster in this patent has a central or pivotal bearing and lateral or side bearings; it is supported upon longitudinally extending semi-elliptic springs; the ends of the bolster engage with the semi-elliptic springs beneath the side frames; the upper part of the bolster strikes against the side frames to prevent excessive lateral movement; the semi-elliptic springs are sus-



pended from the side frames by universally moving links, and the links are located adjacent to the axle-boxes, so as to distribute the weight; the links are attached at the central part to the side frames; the side frames are outside the wheel base; and the bolster has transverse and likewise longitudinal movement as far as the transoms will permit, swinging on the links. The foregoing de-

381 scription which we extract from the testimony of Mr. Abbott, the defendant's expert, we think is quite accurate, and we also adopt as correct his conclusion, that the Thyng patent discloses every feature of the principal combination of the patents in suit, with the single exception that the links are not extensible, or in other words do not embody a spring. This conclusion is confirmed by the opinion of the complainant's expert, Mr. Livermore, who (referring to certain prior patents) says:

"The first is the Thyng patent, No. 4276, dated November 18, 1845. My comparison of the structure shown in this patent with the Brill truck has before been fully given. It does not disclose a car truck embodying the combination of a truck-frame having side frames, a bolster, longitudinally arranged semi-elliptic springs supporting the ends of the bolster, the elastic links or elastic or extensible suspensions of any kind connecting the ends of the semi-elliptic spring with the side frames. It does, however, embody a combination including all of the above-named elements except the elastic and extensible links, and it has non-elastic links jointed for transverse swinging to connect the ends of the semi-elliptic spring with the side frames."

It appears then that the only advance made by Brill on Thyng was to substitute for the latter's non-elastic links for supporting the semi-elliptic springs, extensible or elastic links. But elastic or spring links, or spring suspended links, were old in car trucks before the time of Brill's improvements here in suit. This record is replete with instances in the prior art, in which spring-links, or spring suspended links, practically identical with those of the complainant's patent, were employed in car trucks for substantially the same purpose as are Brill's. For example, Longstreth's patent No. 249,962, dated November 22, 1881, illustrates spring-supported links which support the ends of semi-elliptic springs. The Heffernan patent No. 412,256 dated October 8, 1889, shows the combination of a truck-frame, spring links depending from the truck-frame, semi-elliptic springs connecting the links and means for connecting the latter springs with the car body. In his specification Heffernan states:

"I have herein shown my invention as applied to locomotives and have also described the spring as being connected to certain character of frames or trucks; but I would herein state that I do not limit my invention either to a locomotive or to suspending the same from the bars described, as other forms of trucks requiring minor changes in this regard may be used in connection with my invention."

In Graham's patent, No. 503,044, dated August 8, 1893, semi-elliptic springs and extensible or spring links are employed to support the car through the truck-frame instead of through the bolster.



But here we agree with the defendant's expert that "obviously the construction and co-active relationship of the parts are the same, and anyone at all acquainted with mechanical matters will at once perceive that if a semi-elliptic spring and such spring links can be employed to support a car body in the manner shown in Graham patent, that it can likewise be employed in the manner shown in complainant's patent."

The patent of Brill and Curwen, No. 610,118, issued August 30, 1898, upon an application filed November 8, 1896, shows as belonging to the prior art equalizing bars movably and resiliently suspended by spring links from the side frames of a car truck.

In this connection and as part of the prior art, the Peckham patent- No. 464,253, and No. 563,685, dated respectively December 1st, 1891, and July 7, 1896, merit particular consideration. In these Peckham patents spring links are employed for supporting a load (the nose of the motor) so that it may have a universal and swinging motion, which is the function broadly of the spring links of the Brill patent here in suit. The spring link illustrated in Fig. 4 of the Peckham patent No. 563,685, is practically identical with that of the complainant's patents. It has the ball and socket or universal head at its upper end, seated in a corresponding socket in the bar that supports it, and it embodies a spring with which the part it supports engages. The specification of this Peckham patent (referring to this spring link) states:

"the rods, 29, are provided at their upper ends with ball bearings, 31, operating within sockets, 32, which are bolted between the duplex transverse beams, 33. \* \* \* By this construction of motor support, the requisite flexible connection is secured for the heel of the motor."

Testifying with respect to this patent, Mr. Abbott expresses the following view which we think is entirely sound:

"Peckham employs this universally swinging link to support the motor in his truck, but obviously it is immaterial whether the weight supported by such a link be a portion of the load of the car, or a portion of the weight of the motor. The construction of the device and its co-active relationship with the parts with which it connects, being once understood, it is adaptable within the common knowledge of any ordinary mechanic, to a multitude of mechanical constructions."

The evidence, we think, fairly leads to the conclusion that the patentee, Brill, took the combination of Thyng's patent, but instead of using the latter's form of link, substituted therefor another old form of link which had been commonly used for the same analogous purposes, namely, an elastic or spring controlled link the character and function of which were well understood in the art. This substitution may have secured better results, but it did not involve invention.

Stimpson *v.* Woodman, 10 Wall., 117; Smith *v.* Nichols, 21 Wall., 112; Pennsylvania Railroad Company *v.* Locomotive Truck Company, 112 U. S., 490; Office Specialty Mfg. Co. *v.* Fenton Mfg. Co., 174 U. S. 492.

We have already made brief mention of the patent to Brill and Curwen, No. 610,118, dated August 30, 1898, issued upon an application filed November 3, 1896, which patent is for improvements in pivoted car trucks especially that class of trucks used on passenger cars electrically propelled. The declared primary object of 383 the Brill and Curwen invention is to produce an easy riding truck,—a truck having a great degree of elasticity, so as to enable it to adjust itself with the minimum amount of disturbance to the inequalities of the track. This patent has a more important bearing on the present controversy than yet has been intimated. It is the subject of the disclaimer contained in the principal patent in suit, No. 627,898. That disclaimer is as follows:

"The location of the semi-elliptic springs outside of the wheel-gage on each side of the truck, together with the location of the links for supporting the semi-el-iptic closely adjacent to the axle-boxes and the swinging of said springs from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck transoms within the wheel-gage. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the 3d day of November, 1896, Serial No. 610,902, and therefore I do not claim the same herein."

The court below held that this statement did not amount to a disclaimer of the combination of claim 13 and "all that was meant was that the patentee did not claim that the mere location of the semi-elliptic springs 'outside of the wheel-gage' and location of the spring links 'closely adjacent to the axle-boxes' involved novelty or patentability."

But, without questioning this interpretation it still may be affirmed that an important effect must be given to the disclaimer. It is a solemn concession of priority in favor of Brill and Curwen. The filing and issue dates of the Brill and Curwen patent show *prima facie* their priority over Brill, and we find no satisfactory evidence to rebut that *prima facie* showing. But the admission of the disclaimer settles the question of priority in favor of Brill and Curwin. Patent No. 610,118 to Brill and Curwen must be taken as part of the prior art. Now, the Brill and Curwen patent shows the combination in a car-truck of the truck-frame, spring links depending from the truck frame, equalizing bars connecting the links and means for connecting the equalizing bars with the car body. We here quote two of the claims of the Brill and Curwen patent, namely claims seven and twelve:

"7. The combination in a car-truck of the side frames, spring-links depending from the side frames, longitudinal equalizing bars connecting links below the side frames, and means for connecting said bars with a car body, substantially as described.

12. The combination in a car-truck, of the sideframes, the equalizing-bars movably and resiliently suspended from the side frames, and a bolster supported on said equalizing bars, substantially as described."

It is obvious that the only difference between the combination

shown and claimed by Brill and Curwen and the principal combination of the claims involved in this suit is, that the latter claims call for semi-elliptic springs for connecting the links, instead of equalizing bars. But we cannot agree that this is a patentable difference, in view of the prior art. As we have seen it was old to use semi-elliptic springs for connecting the links. Moreover it

384 most clearly appears from the proofs that in the combination in question a semi-elliptic spring performs the function of an equalizing bar. Although flexible, the semi-elliptic spring acts as an equalizer. So much is conceded even by Brill patent in suit, No. 627,898, which in its specification states: "The semi-elliptic longitudinally disposed springs not only afford efficient spring support of the car body on the truck, but act in a measure as equalizers, distributing the weight equally on the axle-boxes." The mere substitution of the old form of flexible equalizer, to wit, the semi-elliptic spring in place of the inflexible equalizer of Brill and Curwen, did not involve invention.

Upon consideration of all the proofs we hold that claim 13 of the Brill patent No. 627,898, and all the other claims in suit which rest upon the like combination, lack patentable invention.

If any of the claims in suit can be sustained at all, it can only be by limiting them to the specific form of link described in the complainant's patents. But if so limited, infringement does not appear. The difference between the link of the complainant and the defendant's link are marked. The link of the complainant's patent embodies the following features: (1) a bolt or rod having a hemispherical head which fits into a like hemispherical seat at the top of the side bar; (2) a spiral spring enclosing the rod below the side bar; and (3) a stirrup or hanger, the lower end of which is below the rod and there engages with the end of the semi-elliptic spring, the upper end of the stirrup passing inwardly so as to rest upon a cap which is placed above the spring. In consequence of this construction, the complainant's link has an unrestrained universal swing or movement, and also a telescopic or lengthening or shortening action by reason of its several parts sliding with relation to each other. The defendant's link is not so constructed nor has it such universal swing or such sliding movement. The defendant's rod has not a hemispherical head but a crutch-shaped head, and therefore has not an unrestrained universal movement. The defendant's link has lateral swing but longitudinal movement is resisted. The defendant has not the stirrup or hanger of the complainant's patent. The defendant does not have a spiral spring enclosing the rod below the side bar. On the contrary, the defendant's link is supported above the upper side of the side bar by a spring buffer. The evidence satisfies us that these differences are not formal but substantial and material as respects results. We hold, therefore, that the defendant's links do not infringe the claim in question.

The decree of the Circuit Court is reversed, with costs, and the case is remanded to that Court with direction to enter a decree dismissing the bill of complaint with costs.

Filed January 3, 1905.

## DEFENDANT'S EXHIBIT NORTH JERSEY FINAL DECREE.

At a Stated Term of the United States Circuit Court, for the District of New Jersey, held in the United States Court Rooms in the Post Office Building, at Trenton, N. J., on the twelfth day of April, 1905.

Present: Honorable W. M. Lanning, District Judge, Holding the Court.

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In Equity.

JOHN A. BRILL, Complainant,

vs.

THE NORTH JERSEY STREET RAILWAY COMPANY, Defendant.

The defendant herein, The North Jersey Street Railway Company, having heretofore appealed to the United States Circuit Court of Appeals, for the Third Circuit, from the interlocutory decree made by this Court in the words following, to wit: "Ordered, adjudged and decreed that letters patent of the United States granted to George Martin Brill, No. 627,898, dated June 27, 1899, for new and useful improvement in car-trucks for motor propulsion are good and the complainant thereunder, as to claims 6, 10, 11, 13, 14, 15, 30, 80, 87 thereof; and that letters patent of the United States granted to George Martin Brill, No. 627,900, dated June 27, 1899, for improvements in car-trucks are good and valid letters patent as to claims 13 and 17 thereof; and that the complainant, John A. Brill, is entitled to the exclusive rights in, to and under said letters patent, and each of them, and in and to the inventions and improvements secured thereby, respectively, and that the title thereto and to each thereof, is duly vested in the complainant, John A. Brill, and that the defendant, The North Jersey Street Railway Company, has infringed upon the said letters patent No. 627,898, and upon the exclusive rights of the complainant thereunder, as to claims 6, 10, 11, 13, 14, 15, 30, 80, 81 and 87, and has infringed upon the said letters patent No. 627,900, and upon the exclusive rights of the complainant thereunder, as to claims 13 and 17 by purchasing from the manufacturers, and using car-trucks containing the improvements, inventions and subject-matters described and claimed as new in the above specified claims of the said respective letters patent, and has infringed upon the exclusive rights of the complainants thereunder as secured by the said respective letters patent and the said respective claims thereof.

\* \* \* \* \*

In consideration that the defendant is a street railway company and that it is operating the trucks complained of in the public service, it is ordered that the injunction be suspended so far only as relates to such trucks that have been heretofore purchased by the defendants, until the final determination of an appeal from this decree, provided that said appeal be taken within thirty days and be prosecuted with diligence, and provided that the defendant file of record

within fifteen days a bond in the penal sum of fifteen thousand dollars, with security to be approved by the court conditioned upon holding the complainant indemnified against all damages and loss in the premises by reason of the suspension of the operation of the writ of injunction."

And the Circuit Court of Appeals having at the March term, 1904, duly heard the said appeal upon the transcript of record and having thereupon ordered, adjudged and decreed that the decree of the said Circuit Court in this cause be reversed with costs; and the said Circuit Court of Appeals having remanded this cause to this Court with instructions to enter a decree in accordance with the opinion of said Court, which said decree, order and instructions appear to this Court by the mandate and opinion of the said Circuit Court of Appeals:

Now, Therefore, on filing the said mandate, it is hereby ordered, adjudged and decreed as follows:

That the decree of the said Circuit Court in this cause be, and the same is hereby reversed with costs, and that the said Respondent, the North Jersey Street Railway Company, recover against the said complainant, John A. Brill, thirty-nine dollars and twenty-nine cents for its costs herein expended, and have execution therefor.

That the bill of complaint herein be, and the same is hereby dismissed with costs to be taxed and that such execution and further proceedings be had in said cause in conformity with the Opinion and Decree of the said Circuit Court of Appeals as according to right and justice and the laws of the United States ought to be had the said appeal notwithstanding.

W. M. LANNING, Judge.

DEFENDANT'S EXHIBIT ORDER DENYING COMPLAINANT'S PETITION FOR REHEARING.

In the United States Circuit Court of Appeals for the Third Circuit.

THE NORTH JERSEY STREET RAILWAY COMPANY, Appellant,

vs.

JOHN A. BRILL, Appellee.

Before Acheson, Dallas and Gray, Circuit Judges.

*Sur* Petition of Appellee for a Re-hearing.

And now, March 13, 1905.

*Per Curiam*: The petition for re-hearing is denied.

Filed March 13, 1905.

## DEFENDANT'S EXHIBIT PECKHAM MFG. CO. ORDER ON MANDATE.

At a Stated Term of the Circuit Court of the United States for the Southern District of New York, held in the United States Post Office Building, in the City of New York, on the tenth day of February, 1905.

Present: Honorable E. Henry Lacombe, Judge.

## In Equity.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Complainants,  
vs.

PECKHAM MANUFACTURING COMPANY, EDGAR PECKHAM, CHARLES H. Duell, Jacob R. Beetein, George H. Bowers and Henry G. Lewis, Defendants.

An order having been made and entered herein, in the office of the Clerk of this Court, on the 15th day of January, 1904, whereby  
387 it was ordered, adjudged and decreed that letters patent of the United States (Nos. 627,898 and 627,900) were duly issued to George Martin Brill, and that John A. Brill and the J. G. Brill Company were entitled to exclusive rights thereunder, and further ordered, adjudged and decreed that an injunction be issued out of and under the seal of this Court, enjoining the Defendants, the Peckham Manufacturing Company, and its officers, agents, attorneys and workmen, from making, using or selling, or causing the same, any Car Trucks embodying the inventions described in the said letters patent and claims 6, 10, 11, 13, 14, 15, 30, 80, 81, 87, of said letters patent 627,898, and claims 13 and 17 of letters patent 627,900, and specifically, Defendants' "No. 14-B-3" and "No. 14-B-3-X" truck, and from infringing upon Complainants' rights thereunder; and said injunction having been suspended upon the filing of a bond in the sum of ten thousand dollars (\$10,000).

And the Defendants having appealed from said order to the United States Circuit Court of Appeals for the Second Circuit, and said appeal having been duly heard and considered, and said United States Circuit Court of Appeals for the Second Circuit having issued its mandate to this Court, whereby it is ordered, adjudged and decreed that the order of this Court herein be reversed with costs in the said United States Circuit Court of Appeals taxed at the sum of nine hundred, fifty-eight and twenty-five one-hundredth-dollars. (\$958.25); said mandate also directing that such further proceeding be had in said cause in accordance with the decision and mandate of the said United States Circuit Court of Appeals for the Second Circuit; as, according to right and justice, and the laws of the United States, ought to be had, said appeal notwithstanding:

Now, upon reading and filing said mandate, and upon motion of Warfield & Duell, Counsel for the Defendants herein, it is

Ordered, and this Court does hereby order that the said mandate of the said Circuit Court of Appeals for the Second Circuit in this



cause be, and the same hereby is, made the judgment and decree of this Court, and that the order entered by the Complainants herein, be, and the same hereby is reversed with costs, and it is further ordered, adjudged and decreed that the Defendants do have and recover of the Complainants, John A. Brill and the J. G. Brill Company, the sum of nine hundred, fifty-eight and twenty-five one hundredth dollars (\$958.25), the costs taxed in said Circuit Court of Appeals for the Second Circuit, and that the said Defendants have judgment and execution therefor against the said Complainants, and it is

Further Ordered, that the bond in the sum of ten thousand dollars filed on the 25th day of January, 1904, and given by the Peckham Manufacturing Company, as a condition of suspending the injunction of this Court, be, and it hereby is cancelled, and it is

Further Ordered, that the Defendants recover the sum of \_\_\_\_\_ dollars ( \_\_\_\_\_ ), costs in this court, and that they have judgment and execution therefor against the said complainants.

E. HENRY LACOMBE, U. S. C. J.

A Copy,  
JOHN A. SHIELDS, Clerk.

388 DEFENDANT'S EXHIBIT "PECKHAM MOTOR TRUCK & WHEEL COMPANY ORDER DISSOLVING INJUNCTION."

United States Circuit Court, Southern District of New York.

In Equity. No. 8607.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,

vs.

PECKHAM MOTOR TRUCK & WHEEL COMPANY, EDGAR PECKHAM, Erwin G. Long, John H. Bickford, and Theodore Spore, Defendants.

A motion having been made herein upon notice before me at a term of this Court on the 14th day of April, 1905, to dissolve the preliminary injunction heretofore issued in this cause on the ground that the decree for the United States Circuit Court for the District of New Jersey in the suit of John A. Brill vs. North Jersey Street Railway Company, has been reversed on appeal;

Now, therefore, upon consent of all parties, it is hereby

Ordered, that the preliminary injunction heretofore issued in the above entitled action be and the same hereby is dissolved without costs to either party, the order granting the same being hereby vacated.

E. HENRY LACOMBE, U. S. C. J.

April 15, 1905.

A Copy,  
JOHN A. SHIELDS, Clerk.

DEFENDANT'S EXHIBIT PECKHAM MFG. CO. OPINION, COURT OF  
APPEALS, SECOND CIRCUIT.

United States Circuit Court of Appeals for the Second Circuit.

No. 201. October Term, 1903.

Argued April 19, 1904; Decided January 9, 1905.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Complainants-  
Appellees,  
vs.

THE PECKHAM MANUFACTURING COMPANY, Defendant-Appellant.

Appeal from the Circuit Court of the United States for the Southern  
District of New York.

Before Judges Wallace, Townsend and Coxe.

*Per Curiam*: Upon the authority of North Jersey Street Railway  
Company v. John A. Brill, decided by the Circuit Court of Appeals  
for the Third Circuit, on January 4, 1905, the order granting an in-  
junction is reversed with costs.

Charles H. Duell, for the Appellant.

Edmund Wetmore and Francis Rawle, for the Appellees.

A true copy.

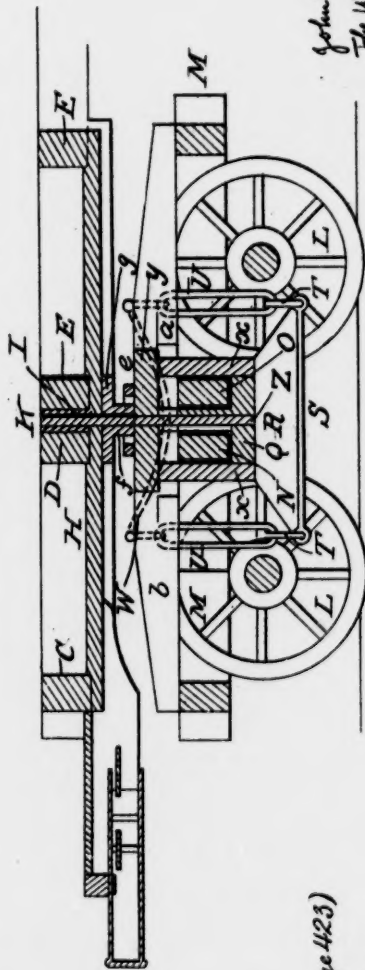
WM. PARKIN, *Clerk*.

(Here follow diagrams marked pp. 389 and 390.)



## Davenport and Bridges

Patent 183



(Page 423)

Part of Fig. 3. on enlarged scale

Allan Groove.

U.S. Circuit  
 So. Dist. of N.Y.  
 J. H. Bell was  
 for the  
 Plaintiff

Defendant's exhibit and amended drawing  
 of part of fig 2 of Davenport & Bridges  
 Patent.

Wm. M. Seaman  
 Notary Public #53

The Eastern Water Power & Mill Co.

H. M. Seaman

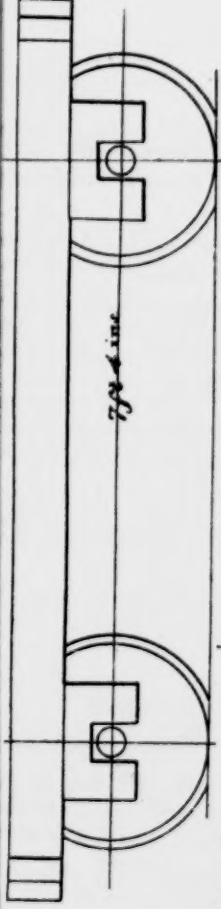
Notary Public #53

New York Co.

John A. Brill et al  
 vs  
 The Washington Railway  
 & Electric Co of D.C.  
 Supreme Court of D.C.  
 Defendant's exhibit  
 Enlarged drawing of  
 part of fig 2 of  
 Davenport & Bridges  
 Patent.

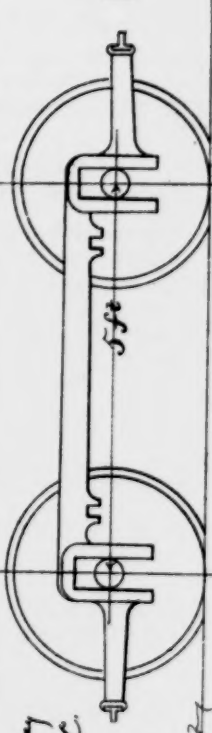
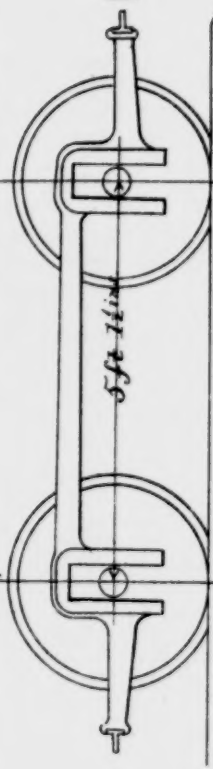
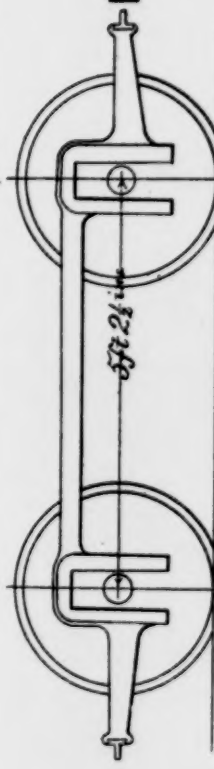
389

W. S. C.

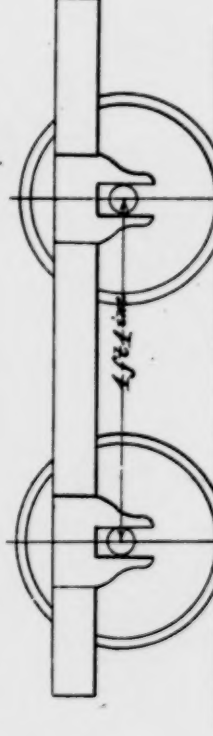
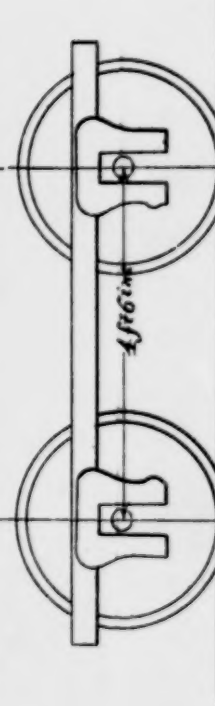
**BUCK**

John A. Bickel  
 The Washington Railway  
 & Electric Co. Inc.  
 Supreme Court of D.C.  
 "Dependent's Sublet"  
 Proprietors of Wheel  
 Bases. J. A. B.

and a 5-27

**BRILL & CURWEN****BRILL 627,898****BRILL 627,900**

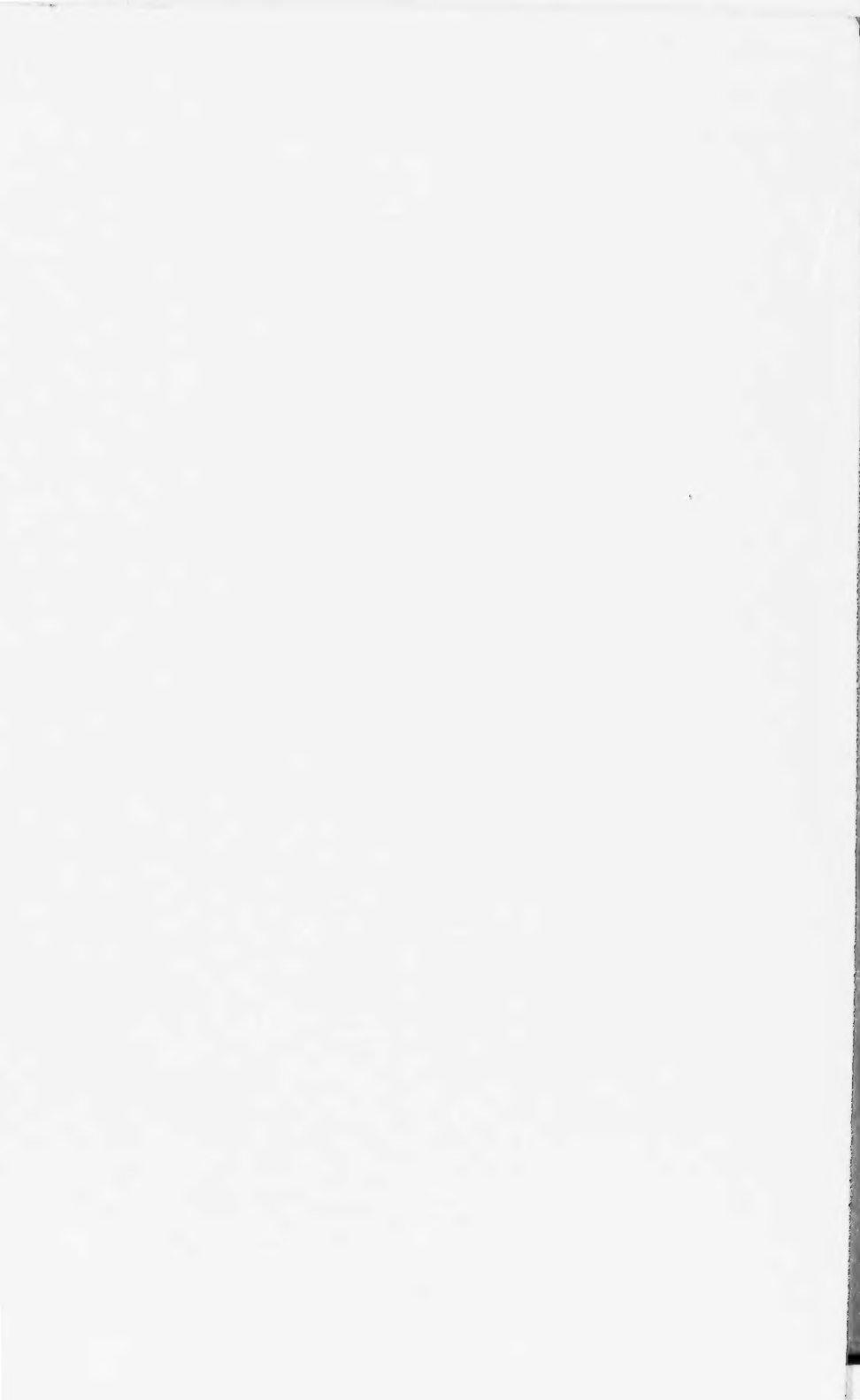
PATENTS  
 IN  
 SUIT

**THYNG****TAYLOR****DAVENPORT &  
BRIDGES**

U. S. Court  
 for Dist. of N.Y.  
 J. S. Bickel  
 Proprietors of Wheel  
 Bases. J. A. B.

U. S. Court  
 for Dist. of N.Y.  
 J. S. Bickel  
 Proprietors of Wheel  
 Bases. J. A. B.

(page 224)



391 &amp; 392

Filed March 14, 1906.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY, Complainants,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY, Defendant.

*Rebuttal.*FEDERAL BUILDING,  
PHILADELPHIA, June 8, 1905.

Rebuttal testimony upon behalf of the complainants, taken before Samuel Bell, Esq., United States Commissioner, at his office, Federal Building, Philadelphia, Pa., on Thursday, June 8, 1905, at 10.30 o'clock A. M.

Present: Samuel Bell, Esq., Special Examiner.  
Francis Rawle, Esq., for Complainants.

Counsel for complainants states that defendant's counsel had requested that the meeting be adjourned until Friday, June 9, 1905, at 10.30 o'clock A. M., to suit their professional engagements; that complainants' counsel had expressed a willingness to adjourn this present meeting until that time, provided he could arrange his witnesses, to which complainants' counsel received the following telegram, which is now placed upon the record:

"NEW YORK, June 7, '05.

"Francis Rawle:

"Arrangements satisfactory. Wire at your earliest convenience.  
"WARFIELD & DUELL."

Adjourned to meet at this office at 10.30 A. M., on Friday, June 9, 1905.

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POST OFFICE BUILDING,  
PHILADELPHIA, June 9, 1905—10.30 A. M.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner.  
Francis Rawle, Esq., for Complainants.  
Warfield & Duell, for Respondent.

WALTER S. ADAMS, a witness previously sworn in the cause, on behalf of the complainants, testified as follows:

By Mr. RAWLE:

Q. 1. You have already been a witness in this case. Have you had experience with the Brill Company as a pattern maker, and if so, when?

A. Yes, I have; from the years 1885 to 1890.

Q. 2. State whether or not, while in the employ of the Brill Company, you have been familiar with all the styles of trucks manufactured by them.

A. Yes.

Q. 3. Has that been your department of the works?

A. Yes.

Q. 4. And as to designing trucks and making out practical working drawings, what experience have you had during these years? I mean during your connection with the Brill Company from 1885 to this date.

A. While still employed as pattern maker for the J. G. Brill Company; that is, prior to the year 1890, I started to design and work out details of trucks. After the year 1890 I gave up pattern-making entirely and took up a position in the drawing room, the duties of which were to give my attention entirely to designing and working out details and attending to everything pertaining to all truck orders received by the J. G. Brill Company and all trucks that they designed.

Q. 5. Have you designed any truck or trucks upon which you have applied for letters patent?

A. Yes.

Q. 6. What experience have you had in the practical working of the various types of truck manufactured by the Brill Company?

A. It has been a part of my duty to watch these trucks in actual operation, particularly new types of trucks.

Q. 7. Where have you watched them in practical operation, that is, under what circumstances?

A. Under all circumstances that they are subject to when performing the objects for which they were built, such as carrying car bodies, loaded and unloaded, low speed, high speed, and under all other similar conditions.

Q. 8. Do you mean that you have been sent off to visit your customers' roads in various parts of the country and at various times?

That is what I had in my mind.

394 A. Yes, I have visited many of the principal cities in the performance of these duties.

Q. 9. Has this been a common practice with you from year to year?

A. It has been.

Q. 10. State whether or not the Brill Company has electric railway trackage in its works, used for experimental purposes?

A. Yes, it has.

Q. 11. To what extent have you, since the introduction of electric street railway trucks, had knowledge and made practical observations of various types of trucks made by other truck builders?

A. I have had unlimited opportunities of this kind, and always endeavored to avail myself of learning everything I could of other makes of trucks, such as the Peckham trucks, Bemis trucks, Maguire trucks, and other makes.

Q. 12. State whether or not you have made any practical observa-

tion of types of trucks other than the Brill at the Brill Works to any extent.

A. Yes, I have observed trucks of other makers at the Brill Works, such as the makes above mentioned, and others.

Q. 13. How did they happen to come there?

A. Generally, they are sent there to go under cars built by the Brill Company.

Q. 14. I hand you a photograph of a car truck, and ask you to state what it represents.

A. It represents a pivotal truck manufactured by the J. G. Brill Company, and is a photograph of the first lot of trucks of this type which they made.

Q. 15. State when the work was first begun on this lot of trucks, when they were shipped, and to what company they were sold.

A. The work on these trucks was begun in the early part of 1896, and they were shipped in March, 1896, to the Mill Valley and Mount Tamalpais Scenic Railway.

(The answer is objected to and motion is made to strike the same from the record, on the ground that it is incompetent and irrelevant, and on the further ground that the witness has not qualified in respect to the question and answer.)

Q. 16. What personal knowledge have you of the designing, constructing and completion of these trucks, beginning the story and carrying it down to the time of shipment, referring to any drawings that were made?

A. I personally made some drawings and had others made directly under my supervision for these trucks. I also personally worked out the details and ordered material, and watched the material in the course of construction and assembling, and saw these trucks in the condition as shown in the photograph just previous to shipment.

Q. 17. Please produce any original drawings made by you or made in your department, under your direction and personal supervision in connection with the manufacture of these trucks.

(Objected to as leading and as embodying conclusions.)

395 A. I produce four brown paper drawings as follows:

1. Drawing dated January 22, 1896.

2. Drawing dated March 16, 1896.

3. Drawing dated March 19, 1896.

4. Drawing dated May 22, 1896.

All these drawings were made directly under supervision, with the exception of that dated March 19, 1896, which I made personally.

(The foregoing drawings and all reference thereto is objected to as being incompetent and irrelevant and an improper subject for rebuttal testimony. Notice is hereby given that at the proper time a motion will be made to strike the entire foregoing deposition from the record, on the grounds here specified; for leave to take testimony in sur rebuttal, and for such other and further relief as may appear just.)

Q. 18. State what relation these four brown paper drawings had to the construction of the trucks referred to by you and shown in the photograph produced by you.

(Same objection and notice, which by stipulation of counsel is to be taken to extend to this entire line of examination.)

A. The first three mentioned drawings show details of the trucks referred to. These drawings were used by the different departments of the Brill Company to make the material shown. The fourth drawing mentioned is a side elevation of the truck shown in the photograph. This drawing was made after the trucks had been assembled and shipped.

Q. 19. State whether or not they constitute the full and complete original working drawing used in the construction of those Mount Tamalpais trucks.

A. They do.

Q. 20. State whether or not these four brown paper drawings were made by your assistants in the Brill drafting rooms, under your direct personal supervision and instructions.

A. They were, with the exception of the one which I have stated was made by myself personally.

Q. 21. State whether or not you saw them when completed.

A. Yes, I gave instructions to make them, how to make them, and inspected them after they were completed.

Q. 22. I observe that these drawings bear dates. What have you to say about those dates as fixing the respective dates at which those drawings were completed in their present condition?

A. The dates I have given in my testimony as appearing upon these drawings are the dates on which they were completed, and were put on at that time. There are other dates on two of these drawings, stating when they were traced—that is, on the drawing of March 19, 1896, there also appears "Traced 6-7-'98, F. W. B." This indicates that the tracing was made from this drawing at that date by the party whose initials appear.

On the drawing dated January 22, 1893, appears, "Tracing made 1-24-'96. Drawing incorrect; see tracing. W. R. A., 1-24-396 '96." This indicates the date the tracing was made from this drawing at that date by the party whose initials appear thereon.

On the drawing of March 16, 1896, appears the word "Tracing." This indicates that a tracing was made from this drawing.

(Special objection is taken to the foregoing, on the ground that it is secondary evidence, and the same notice is given as above.)

Q. 23. Look at the drawing of March 19, 1896, and state whether or not any subsequent matter was written thereon other than what you have stated.

A. Yes, I find the following appears on this drawing in pencil: "This way on 7082½ and 7206"; "3 on 7082½"; "10½ on 7282½"—should have been "9½ W. S. A." "10½ on 7206 Ord."

In addition to this the Brill rubber stamp in the lower right hand

corner, giving the order number, drawer number and drawing number. All four of these drawings have the Brill rubber stamp thereon.

Q. 24. State whether or not you made or had made, previously to January 22, 1896, the date of the first of these brown paper drawings, another drawing relating to this type of truck. If so, produce it.

A. I did, and here produce brown paper drawing, dated December 30, 1895.

Q. 25. State what you know about the making of this drawing and the date at which it was made.

A. This drawing was made under my direct supervision, under instructions from Mr. G. Martin Brill, President of the J. G. Brill Company, by a person by the name of Allen. The drawing was completed on the date marked thereon, December 30, 1895.

Q. 26. State whether or not you saw it in its completed condition on that date, and whether that date was on it when you saw it.

A. I saw it on the date stated and at the various stages previous, and the date given on the drawing was put on at the time it was completed.

There are other marks on this drawing, "Tracing made 1-14-'96, W. R. A." This was put on at the time the tracing was completed, made from this brown paper drawing. The following also appears on this brown paper drawing: "O. K., G. M. B." This is the approval of this drawing by G. Martin Brill, and was put on this drawing before the tracing was made from it. I recognize this writing as the initial signature of G. Martin Brill.

(Same objection and notice is given which by stipulation applies thereto. Special objection is made to the secondary character of the testimony and to the lack of qualification of the witness, and notice as above is given.)

Q. 27. State whether or not you are familiar with the handwriting of Mr. G. Martin Brill.

A. Yes, I am.

Q. 28. State how you became so.

A. I have seen him write many times in my presence.

397 Q. 29. State whether or not the letters on the brown paper drawing of December 30, 1895, "O. K., G. M. B.," are in the proper handwriting of Mr. G. Martin Brill.

A. Yes, they are.

Q. 30. State whether or not the drawing of December 30, 1895, was made for general purposes or for some particular truck order then pending.

(Objected to as indefinite and immaterial.)

A. It was made for general purposes.

Q. 31. You have stated that tracings were made of these five respective brown paper drawings. Please produce such tracings.

A. I produce five tracings. Four of them were made from the four respective brown paper drawings as first produced by me, as follows:



1. Tracing dated January 24, 1896 (made from brown paper drawing of January 22, 1896.)

2. Tracing dated March 16, 1896 (made from brown paper drawing of March 16, 1896.)

3. Tracing dated March 19, 1896 (made from brown paper drawing of March 19, 1896.)

4. Tracing dated May 25, 1896 (made from brown paper drawing May 22, 1896.)

The fifth tracing produced by me was made from the brown paper drawing of December 30, 1895; is dated January 14, 1896.

Q. 32. State whether or not you had knowledge of these tracings at the times they were made respectively.

A. Yes, they were made under my direction and supervision, and I saw them when completed.

Q. 33. Please state whether or not these tracings correctly represent in every particular, the constructions shown in the respective brown paper drawings from which you say they were made; that is, whether or not they are facsimiles.

#### Recess.

A. These tracings are facsimiles of the respective brown paper drawings, with the exception of some written matter which appears on the tracings and do not appear on the brown paper drawings and *vice versa*. The above relates to the first four of the tracings.

On the tracing dated January 14, 1896, the motor springs do not appear on the side elevation, but they do appear on the side elevation on the brown paper drawing. These springs appear in the end elevation on both the tracing and brown paper drawing. Other than these exceptions they are facsimiles.

Q. 34. All of them?

A. Yes.

Q. 35. State whether or not these drawings, among them, show the construction of the Mount Tamalpais Scenic Railway trucks so far as the matter here in controversy goes.

(In addition to the foregoing objections which enure by stipulation, a special objection is taken to the question as indefinite, as well as being incompetent, the witness not having qualified as to his knowledge of "the matter here in controversy goes.")

A. They do.

Q. 36. State whether or not these drawings, among them, show the construction of Letters Patent in suit, No. 627,898 and No. 627,900.

A. Yes, they do.

Q. 37. Which of these drawings and corresponding tracings show the method of spring suspension of patent in suit 627,898, and which show that of the second patent in suit, 627,900?

A. Tracings of the following dates show the 627,898 patent: March 16, 1896; March 19, 1896; May 25, 1896, January 24, 1896.

The following tracings show the construction as shown in patent 627,900: January 24, 1896; January 14, 1896.

Q. 38. I understand that you are now speaking of the construction of the suspension link parts only?

A. Yes; there are also some other portions of the trucks represented on these tracings that are also like the patents.

Q. 39. I observe an error in my question No. 37. I omitted the word "links," and will ask you to answer it as corrected—that is, which of the tracings show the method of spring suspension links of the respective patents in suit?

A. Tracing January 14, 1896, shows patent 627,900; tracing May 25, 1896, shows the patent 627,898.

Q. 40. Look at the photograph which you have produced of the Brill Mount Tamalpais truck, and state if the wheels thereon appear to bear dates, and what is the significance thereof.

A. On one wheel appears the date of March 9, 1896; on another wheel appears the date of March 10, 1896. These dates represent the day on which the wheel castings were made by the wheel makers, which in this case was the Lobdell Car Wheel Company, of Wilmington, Del. This is universal practice with car wheel makers to cast the date on each wheel.

Q. 41. What was the Brill order number of this truck order manufactured for and sold to the Mount Tamalpais Railway Company?

A. 7047 is the order number.

Q. 42. Does this order number appear on any of the drawings and tracings produced by you?

A. It does. It appears on three of them.

Q. 43. Please produce the regular sales book of the J. G. Brill Company, covering 1896, and turn to any entry relating to the Brill trucks which you say were sold to the Mount Tamalpais Railway Company.

(Specially objected to, on the ground that the witness is wholly unqualified in the above specified respect.)

Objection is not had on the ground that the book in question is not one of original entry, or that the entries appearing therein were not made by the witness.

A. I produce J. G. Brill Company's No. 7 sales book, covering the year 1896, which, on the bottom of page 147, under date of  
399 March 28, 1896, shows the shipment of Brill order 7047, which was "6 Patented Pivotal Trucks," to the Mill Valley and Mount Tamalpais Scenic Railway.

Q. 44. State whether or not this sales book is a book of original entries in which entries are made from day to day as the goods are shipped.

A. Yes, it is such a book.

Q. 45. Please produce blue print copies of the five tracings which you have produced.

A. I produce them.

Counsel for complainants offers in evidence the photograph pro-

duced by the witness. It is marked "Complainants' Exhibit, Photograph of Mount Tamalpais Truck."

Also the five brown paper drawings, produced by the witness, which are respectively marked as follows:

1. "Complainants' Exhibit, Paper Drawing, January 22, 1896."
2. "Complainants' Exhibit, Paper Drawing, March 16, 1896."
3. "Complainants' Exhibit, Paper Drawing, March 19, 1896."
4. "Complainants' Exhibit, Paper Drawing, May 22, 1896."
5. "Complainants' Exhibit, Paper Drawing, December 30, 1895."

Also the five tracings produced by the witness, which are marked as follows:

1. "Complainants' Exhibit, Tracing, January 24, 1896."
2. "Complainants' Exhibit, Tracing, March 16, 1896."
3. "Complainants' Exhibit, Tracing, March 19, 1896."
4. "Complainants' Exhibit, Tracing, May 25, 1896."
5. "Complainants' Exhibit, Tracing, January 14, 1896."

Counsel stipulate that the blue prints produced by the witness shall be considered as substitutes for the respective tracings and drawings above offered in evidence, provided that such drawings and tracings shall be subject to the call of defendant's counsel on reasonable notice at any time during the taking of evidence or at final hearing.

Counsel for complainants now offers in evidence the five blue prints produced by the witness, which are marked as follows:

1. "Complainants' Exhibit, Blue Print, January 24, 1896."
2. "Complainants' Exhibit, Blue Print, March 16, 1896."
3. "Complainants' Exhibit, Blue Print, March 19, 1896."
4. "Complainants' Exhibit, Blue Print, May 25, 1896."
5. "Complainants' Exhibit, Blue Print, January 14, 1896."

(Special objection is taken by defendant's counsel to the above photograph, drawings and tracings, on the ground that they are incompetent and irrelevant to prove anything at issue in this cause.)

Complainants' counsel states that this closes the examination of this witness as to the matter upon which he has testified, but that, for the orderly marshaling of complainants' proofs, he may recall him for further examination on other matters, when the necessary antecedent testimony shall have been adduced.

#### 400 Cross-examination.

By Mr. DUELL, *de bene esse*, without waiver of objections:

X Q. 46. Please describe the railway trackage used for experimental purposes with car trucks at complainants' works.

A. This runs around nearly the entire works of the J. G. Brill Company, and I would say that it approximates about one or two miles of track. There are curves, switches, frogs and all the different features of the regular railway on the line of these tracks; sometimes one portion of it is used for experiments and sometimes the other portion.

X Q. 47. What is the greatest distance of continuous straight trackage?

A. I would say about 1000 feet or more.

X Q. 48. Of what character is the rails?

A. Chiefly T-rails. There are some flat rails used also.

X Q. 49. Does this railway trackage connect with the Pennsylvania Railroad or other roads?

A. It is connected with the Pennsylvania Railroad, the Baltimore and Ohio Railroad, and the Philadelphia Rapid Transit Company.

X Q. 50. Were you present when "Complainants' Exhibit, Photograph of Mount Tamalpais Truck," was taken?

A. I have every reason to believe I was.

X Q. 51. Do you know that you were?

A. I do not have any distinct recollection of this particular photograph being taken, but I was present when nearly all the photographs were taken, as they asked my advice from what point of view they were to be photographed.

X Q. 52. Then you do not know when this photograph was taken?

A. It was taken in the month of March, 1896, and I would say either on March 28 or a day or two previous.

X Q. 53. Did you ever see this photograph before the inception of this suit?

A. I have seen facsimiles of this photograph before.

X Q. 54. Doesn't it represent a side-bearing truck?

A. No, it represents a center-bearing truck.

X Q. 55. Is this a photograph of one of the trucks sent to the Mount Tamalpais Railway Company?

A. Yes, it is.

X Q. 56. It is a full size truck, is it?

A. This is a photograph of the full size truck of the railway company.

X Q. 57. I observe that the patent plate secured to the side bar of the truck contains the words, "Patent Pending." What applications were these?

A. I understand that this refers to the patents which were granted June 27, 1899, which were numbered 627,898 and 627,900.

X Q. 58. Was this your understanding at the time the photographs were taken of this truck under your direction?

401 A. My understanding at that time was that a patent had been applied for, or was in the course of being applied for.

X Q. 59. Did you gain this information from George Martin Brill, or, if not, from what source?

A. I either gained it from him or from Mr. John A. Brill, who is the Vice President of the J. G. Brill Company.

X Q. 60. Where did you get your ideas embodied in the drawings for which blue prints have just now been substituted in evidence?

A. That portion of the drawing relating to the swinging links I got from G. Martin Brill, the other portions of the drawing were common practice with the Brill Company, of which I have knowledge.

X Q. 61. Were your instructions verbal or were sketches submitted?

A. Some were verbal and some were illustrated by means of sketches.

X Q. 62. Where are such sketches at the present time?

A. These sketches were never preserved, to the best of my knowledge.

X Q. 63. Do you know why Mr. Brill was not called as a witness to testify to the conception and reduction to practice of the alleged inventions here in controversy?

A. No, I do not.

X Q. 64. Were the drawings and tracings above introduced in evidence likewise introduced in the suit of John A. Brill against the North Jersey Street Railway Company?

A. They are so marked.

X Q. 65. Please state your reference in answer to question 30 to the "general purposes" for which "Complainants' Exhibit, Paper Drawing, December 30, 1895," was made.

A. The reference, "general purposes," means there was no order entered on the books of the J. G. Brill Company at that time for that type of truck.

X Q. 66. Do you know whether or not the trucks to which you have testified as having been shipped to the Mount Tamalpais Scenic Railway, California, were ever used, and if so, under what character of car?

A. If my own knowledge means seeing them, I would have to answer no. I know we have received orders for replacement for these trucks; therefore, I can safely say they have been used, and to the best of my knowledge, are in use at the present day. I understand they are used under cars carrying passengers—in other words, the ordinary electric car.

X Q. 67. Please state whether or not "Complainants' Exhibit, Photograph of Mount Tamalpais Truck," shows the side bearings on a higher plane than the center bearing.

A. Yes, this photograph shows the side bearings higher than the center bearings; the bolsters on the car body under which the trucks rest are deeper at their center than at their sides. This is the common practice with all car builders to make bolsters this way.

X Q. 68. In your answer to question 23, you quote the statement from "Complainants' Exhibit, Paper Drawing, January 22, 1896," "drawing incorrect; see tracing"—referring to "Complainants' Exhibit, Tracing, January 24, 1896." Please explain in what particulars said drawing is incorrect.

A. This refers to a projection that is on the inside bottom of the pedestal, shown on the tracing, but not shown on the brown paper drawing. I would say that this projection has no bearing on the present case in my estimation.

In view of the foregoing direct and cross-examination in the former, whereof complainants appear to have endeavored in a second-hand manner to carry the alleged inventions of the letters patents here in suit back of the filing dates thereof, counsel for defendant objects to the entire foregoing deposition, and moves to strike the

same from the record on the ground that the testimony given is wholly incompetent, irrelevant and secondary, and improper in complainants' rebuttal case, as well as at any other time in the manner here pursued; and further, on the ground that the witness is incompetent and unqualified in the respects for which he has been produced. The foregoing objection and motion apply to the exhibits introduced in evidence.

X Q. 69. Referring to your answer to question 43, please state what price was obtained for the trucks sent to the Mt. Tamalpais Scenic Railway.

A. \$250 each. All f. o. b. San Francisco.

X Q. 70. You have testified that you have applied for letters patent on trucks that you have invented. Please state whether the drawings of those applications, as well as Patent Office drawings generally, are drawn to scale; in other words, are they not merely illustrative?

(Objected to as irrelevant and not proper cross-examination.)

A. Generally, I may say, as a rule, the drawings prepared for the different patents which I have obtained were made to a scale, and I think that the Patent Office drawings were properly proportioned for the different features on which a patent was applied for, although not made strictly to a scale.

X Q. 71. Don't you know as a fact, of which every one who knows anything about applications for letters patent is aware, that Patent Office drawings are merely illustrative, and that, while an effort is made to have them properly proportioned, they, being merely for purposes of illustration, invariably vary from scale?

A. I have observed that patent drawings are fairly well proportioned for the features that patents are desired for. The non-essential parts are very often out of proportion.

X Q. 72. Is the problem of motor suspension and the proper cushioning of the motor from shocks, jerks and jars one of the problems of truck construction?

(Objected to as improper for cross-examination.)

A. Yes, it is.

X Q. 73. As a practical car truck man, is it not a fact that where one wishes greater strength in a truck, stronger parts are used, or the same are re-enforced?

A. Yes.

403 X Q. 74. And when one desires more spring action a spring is employed, is it not?

(Objected to as improper for cross-examination.)

A. Where more spring action is required, it can be obtained by an additional spring, or by making a single spring with more movement.

X Q. 75. Describe the character of the spring suspension of Brill 27-C trucks.

A. On the Brill 27-C trucks there are springs interposed between the journal boxes and the truck frame. There are also spiral springs supported by the side bar of the truck between the wheel base; these



spiral springs in turn support a semi-elliptic spring on each side of the truck under the side bar, this semi-elliptic spring being supported at its ends; all of the above springs work in series. The links that support these spiral springs under the side bars are made so they allow a longitudinal and transverse movement. This is to provide for the elongation of the semi-elliptic spring, and also for a transverse movement of the truck bolster in relation to the truck.

The spring suspension on the 27-C truck is the same as shown in "Complainants' Exhibit, Tracing, May 25, 1896."

X Q. 76. Is the spring suspension and the specific type of spring link shown in "Complainants' Exhibit, Tracing, May 25, 1896," precisely the same as in 27-D and G trucks?

A. They are the same.

X Q. 77. Please state specifically the essential differences between 27-B, 27-C, 27-D and 27-G trucks.

A. The 27-B truck is a center-bearing truck, with the motors supported within the wheel base. The 27-C truck has a high bolster working between the car sills, a portion of the load being carried at the center of the truck and the balance on the sides, with the motors hung within the wheel base. The 27-D is a side-bearing truck, with the motors supported within the wheel base. The 27-G is a center-bearing truck, with the motors supported outside the wheel base.

The truck spring suspension on all these types of trucks is identical.

X Q. 78. Is not it a fact that name plates, having thereon "Patented June 27, 1899," or "3 Patents, June 27, 1899," have been attached to Brill trucks, wherein the semi-elliptic springs, such as appear in the tracings, drawings and blue prints, above introduced into evidence, have been suspended from the side frames by a suspension comprising a metal strap or band straddling the top side bar of the said frames?

(Objected to as improper for cross-examination.)

A. Yes, this name plate appears on such trucks.

X Q. 79. Are there any Brill patents under that date disclosing constructions as far as the general spring suspension is concerned, which are different from the spring suspensions of Nos. 27-B, C, D and G trucks?

(Objected to as improper for cross-examination.)

A. No.

404 X Q. 80. Do you then consider that a construction in which the strap link is employed is the equivalent of that appearing in the four above-mentioned constructions?

(Same objection, and as irrelevant to this issue, and because the opinion of the witness as to the equivalency is inadmissible.)

A. Yes, the result of this operation is the same.

X Q. 81. What is the trade name of trucks employing the strap suspension, as above mentioned?

A. They are still called the 27-G.

X Q. 82. Can you tell how many of the trucks which you have

testified to as having been sold since they were first placed upon the market, namely, the 27-B, C, D and G truck, had this strap suspension, instead of that illustrated in the drawings, tracings, blue prints and photographs above placed in evidence?

(Same objection.)

A. No, I cannot state without consulting the records of the J. G. Brill Company.

X Q. 83. You have testified that nearly 7700 trucks of the above-named types have been sold, and you are unable to state how many of these did not have the link suspension illustrated in the drawings of the two letters patent in suit—in other words, had the suspension.

(Same objection.)

A. No. As stated above, I am unable to tell without consulting records.

X Q. 84. In your answer to cross-question 77, you stated, referring to 27-B, 27-C, 27-D and 27-G trucks, "The truck spring suspension in all these types of trucks is identical," I cannot believe that you have intentionally misstated the facts, and accordingly give you an opportunity to explain this glaring discrepancy.

(Same objection.)

A. All these types of trucks have this same suspension, as shown in the tracings and drawings in suit, with the exceptions of the 27-G trucks, which have been built in the last few years, most of which have had a strap straddling the side bar, in which the semi-elliptic is supported from the spiral spring and the spiral spring from the side bar by a different method, from which the former 27-G trucks were, but in which the operation of the springs and their result I consider are all the same.

X Q. 85. Why did you not state this difference in your answer to cross-question 76?

(Same objection.)

A. They were the same when the 27-D and 27-G trucks were built, and are the same on some thousands of 27-G trucks which are now running.

X Q. 86. Has a different specific type of link than that illustrated in the drawings of the patents in suit ever been employed in any instances in 27-B, C and D trucks?

(Same objection.)

A. No.

405 X Q. 87. Can you state of your own knowledge which lettered style of truck has preponderated in sale?

A. The 27-G.

X Q. 88. Has it had a greater sale than the others put together?

(Same objection.)

A. I would say I believe it has.



X Q. 89. Would you hazard an opinion as to what number of the 7700 (less a few hundred) sales were 27-G trucks?

(Same objection.)

A. No, I cannot tell how many of these have been sold.

X Q. 90. Isn't it a fact that not more than one in ten of the trucks sold had the link suspension disclosed in the drawings of the patents in suit?

(Same objections.)

A. I cannot tell how many, but would say off hand that there were more sold with specific link suspensions like shown in the drawings than the other kind.

X Q. 91. You are willing to make "offhand" the above guess; please hazard "offhand" your opinion as to "what number of the 7700 (less a few hundred) sales were 27-G trucks."

(Same objections.)

A. There may be 2000 of them or there may 4000 of the 27-G trucks, or more.

X Q. 92. About how many 27-G trucks are used in the city of Philadelphia?

(Same objections.)

A. Upwards of 1000.

X Q. 93. You must know, do you not, that the strap suspension 27-G trucks in Philadelphia preponderate to such an extent that it is almost impossible to find one having a suspension of a different character in use? This is self-evident to any observer; but the question is asked as a matter of form.

(Same objection, and because counsel's evidence is not admissible.)

A. I can find hundreds of trucks in use in Philadelphia having the link suspension like that shown in the patents in suit.

X Q. 94. How many 27-B, C and D trucks are in use in the city of Philadelphia?

(Same objections, except as to counsel testifying.)

A. Not any to my recollection.

X Q. 95. Where are they mainly used?

(Same objections.)

A. California, Jersey City, Newark, Hartford, Conn.; Binghamton, N. Y., and other places I do not recall just at present.

X Q. 96. Where are the motors hung in the trucks in use in Philadelphia.

(Same objections.)

A. Outside of the wheel base.

406 X Q. 97. Is that true of all the 27-G trucks?

(Same objections.)

A. Yes.

X Q. 98. What is the wheel base length of the various lettered types of trucks above referred to?

(Same objections.)

A. The 27-B is five feet or less; the 27-C, four feet and four feet six inches; 27-D, four feet; 27-G, four feet is standard. Some few have been made four feet six.

X Q. 99. Have trucks of the various types above named been made with longer wheel bases than these specified? and if so, please state the approximate proportion thereof.

(Same objections.)

A. There have been some 27-B made five feet nine; the 27-C, according to my recollection, the longest is four feet six; the 27-D, the longest, according to my recollection, is four feet; the 27-G, according to my recollection, we made one lot a little longer than four feet six. I cannot tell what proportion of these trucks were made with longer wheel base without consulting the records, with the exception of 27-G, of which I have precisely stated four feet is the standard, and a comparatively few are made any longer wheel base.

Cross-examination closed.

Redirect examination.

By Mr. RAWLE, not waiving any objections:

R. D. Q. 100. State whether or not all the trucks which you have testified to as having these specific variations in the link suspension have contained the generic features of the parent patent in suit, No. 827,898?

(Question is objected to as being manifestly incompetent, irrelevant and leading, and as calling for matter as to which the witness is not and has not qualified, and as containing an assumption that the claims here in suit of the parent patent out of a total of 111 contain the generic features of the alleged invention.)

A. Yes.

Motion is made to strike the answer from the record.

Recross-examination, without waiver of objections:

R. X Q. 101. Please state what the "generic features of the parent patent in suit, No. 627,898," are; that is, what the gist of the alleged invention is?

(The question is objected to as untimely, the cross-examination having been completed; also it is, under any circumstances, improper cross-examination; also because the witness is not here to testify "as to the gist of the invention," and has not been examined thereon.)

407 Counsel for complainants is reminded that, apart from the evident propriety of the question, recross-examination has been had by all parties in the beginning of this cause.

A. The gist of the invention is a semi-elliptic spring under the side bar of the truck supported from or by a spiral spring, which spiral spring in turn is supported from the side bar and links to allow the elliptic spring to elongate and have a transverse motion in relation to the truck. At the center of this semi-elliptic spring is supported a bolster, which in turn supports the car.

Adjourned to meet Tuesday, June 13, 1905, at 10.30 A. M.

OFFICE OF CLERK U. S. CIRCUIT COURT,  
POST OFFICE BUILDING,  
PHILADELPHIA, *June 13, 1905.*

Present: Samuel Bell, Esq., Special Examiner. Francis Rawle, Esq., Counsel for Complainants.

Counsel for complainants states that on account of inability of his two witnesses to attend, he would ask an adjournment to Friday, June 16, at 10.30 A. M., at this office; that he had so notified defendant's counsel yesterday.

Adjourned to meet at this office on Friday, June 16, 1905, at 10.30 A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, *June 16, 1905.*

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner. Francis Rawle, Esq., and Joseph L. Levy, Esq., for Complainants. Warfield & Duell, for Respondent.

LOUIS T. PYOTT, a witness called upon behalf of the complainants, having been duly sworn, testified as follows:

By Mr. RAWLE:

Q. 1. State your age, residence and present occupation.

A. Sixty-three years of age; residence, 1923 Fairmount Avenue, Philadelphia. Occupation, assistant foreman in the pattern department of the Baldwin Locomotive Works, of Philadelphia.

Q. 2. State what your business has been in life, and state chronologically where you have carried it on.

A. I have generally been employed as a pattern maker and designer. I started in the Baldwin Locomotive Works in 1857, 408 the first day of June, as an apprentice to pattern-making. I served my time there and worked several years journey work. I was in charge of the department ten years as a foreman, making twenty years in all at the Baldwin Works. After that I spent two years on experimental work on the Market Street Railway on steam street railway cars of the class known as dummies or steam-propelled cars. At the Baldwin Works I had general charge of all wood work in the establishment and also freight cars for the purpose of carrying locomotives.

After building three dummies, which ran on the Market Street road, I spent two years with the Miles Machine Company, at Philadelphia, in charge of the pattern department. I left them in the

winter of '79-'80, and went to the Ohio Falls Car Company, Jeffersonville, Ind. They built passenger and freight cars complete and railroad trucks. These came under my notice. I was in charge of the pattern department. After that I returned to Philadelphia and entered the employment of F. B. Miles again. I remained there two years, and then entered the employment of Goodell & Waters as a designer of wood-working machinery. I was about two years in their employ. From there I went to New York and entered the employment of the J. H. Blaisdell Machine Company, who were in the same line of business. I returned from New York and entered the employment of L. Powers & Company. This was in the spring of 1886. I remained in their employment four years and a half. I returned to New York and entered the employment of the McLeod Car Heating Company, Worth Street, New York. After I came back from there I entered the employment of Goodell, Waters & Company again. This was about 1891, and I remained in their employ several years.

While in the employ of Goodell & Waters I built several experimental railway trucks—electric street railway trucks. Then I worked in Philadelphia on air brakes, and then on automobiles, and after that I went back to the Baldwin Locomotive Works, where I am now.

Q. 3. Have you had anything to do with taking out United States letters patent, and if so, on what?

A. I have taken out quite a number of United States patents principally pertaining to wood-working machinery, railroad brakes and trucks; some on car construction.

Q. 4. To what extent are you and have you been familiar with making and reading mechanical drawings?

A. I have been thrown in contact with them all through my mechanical experience.

Q. 5. State to what extent and during what years your attention and work has been directed to railroad and street railway and electric railway trucks.

A. During 1875, '76 and '77 my individual attention was given to car and truck construction. At that time it was in steam passenger railway cars, and later on, in 1894 and 1895, and I think 1893, I constructed several trucks with an improved side-entrance street car. These were on electric street railroads.

409 Q. 6. What has been your familiarity with locomotive trucks?

A. While in the employ of the Baldwin concern, which ran over a period of twenty years, truck construction came under my notice.

Q. 7. I hand you a certified copy of U. S. letters patent to Levi B. Thyng, No. 4276, dated November 18, 1845, and a certified copy of the drawing of the same letters patent; also, a blue print purporting to be made from a tracing attached to a certified copy of those letters patent. Please state whether or not you are familiar with these papers and what you did in connection therewith.

(All reference to the blue print before mentioned is objected to as incompetent, irrelevant and secondary.)

A. They were brought to my notice early in 1901. From the knowledge obtained from them I built a truck. I directed the operation. All points of information for construction were obtained from these drawings.

Q. 8. State whether or not you considered in this connection the specification of the thing patented.

A. Yes, I read it over very carefully.

Q. 9. How many trucks did you build?

A. Two trucks.

Q. 10. Will you state whether these two trucks which you built were alike in construction?

A. They were alike in every particular.

Q. 11. Please state whether or not these two trucks represented accurately the construction shown in the Thyng patent.

A. In my honest belief they do represent it exactly.

Q. 12. Will you state whether or not the blue print which I have handed you is the identical blue print from which you worked?

(Same objection to said blue print as above.)

A. That is the print.

Q. 13. In the course of your labors, did you make any drawing which you can produce?

A. Yes, sir; details have to be interpreted to men performing the work. I produce the drawing I made. I made it myself.

Q. 14. What details of construction does this drawing represent?

A. It represents the shackle or spring suspension underneath the side beam of the truck on which the semi-elliptic springs are supported. It also represents a section of the side beam of the truck.

Complainants' counsel offer in evidence:

1. Certified copy of the specification of letters patent to Levi B. Thyng, No. 4276, which is marked "Complainants' Exhibit, Certified Copy Thyng Patent."

2. Certified copy of the drawing of the Thyng patent, which is marked "Complainants' Exhibit, Thyng Patent Drawing."

3. Blue print produced by the witness, which is marked "Complainants' Exhibit, Thyng Patent Enlarged Drawing."

4. Drawing produced by the witness, which is marked "Complainants' Exhibit, Thyng Detail Drawing."

410 (Counsel for defendant objects to the offer and receipt in evidence of the blue print above mentioned as being incompetent, irrelevant and secondary.)

Complainants' counsel states that the original certified copy of the Thyng drawing, from which the blue print just offered was made, was offered in evidence in the case of *Brill vs. North Jersey Street Railway Company*, and has been lost; also that counsel will hereafter produce and offer in evidence another certified copy of said drawing.

Counsel for defendant states that upon the production and offer in evidence of such a certified copy of the Thyng drawing he will withdraw objection to the blue print, provided such certified copy is

found to conform to the blue print, in so far as such drawing is, in other respects, proper and competent evidence.

Q. 15. State whether, after having constructed those two trucks, you made any experiments with them, and, if so, describe them.

Counsel for complainants is requested to state what he expects to prove by the evidence now being adduced, particularly in view of the fact that the claims relied upon of the two letters patents in suit relate only to a specific part of a car truck.

Complainants' counsel does not quite understand the specific reason given in the request, and proceeds with the examination of the witness.

Defendant's counsel explains that the present testimony follows in character that given by the present witness in the North Jersey case, and seems to indicate accordingly that testimony as to the operative-ness of the Thying truck is to be given; in view of the character and relation of the claims relied upon of the patent in suit, defendant's counsel made the above inquiry.

(In default of an answer, defendant's counsel objects to the foregoing question as being entirely incompetent and irrelevant.)

A. I placed a twenty-eight-foot car body on these trucks and loaded the car with about eighty passengers to test the efficiency or inefficiency of the spring system, as arranged in this truck. The actual experiments showed a lengthening of the spring, bringing a severe strain on the connection between the spring and side beam of truck. It was provided with free action in a transverse direction, but was rigid on a longitudinal line, subjecting the shackle or appliance to a severe strain.

Recess.

Q. 16. Who were these passengers?

A. They were men employed at the Brill Works, averaging about 150 pounds apiece.

Q. 17. What was the passenger capacity of this car?

A. The seating capacity was about fifty persons, but the car was built to carry fifty to one hundred and fifty. Eighty passengers would be about an average load, as I considered. Of course, the car was not in motion. This tested the capacity of the springs.

411 Q. 18. What was the weight of the car body and what was the total weight with the load?

A. It was a twenty-eight-foot car body, averaging about 14,000 pounds. A loaded car weighs between nine and ten tons, under those conditions—the eighty passengers.

Q. 19. Where were these trucks with the car body on them when you put the eighty men on the car?

A. At the Brill Car Shops.

Q. 20. Did you operate the car with this load?

A. I did not operate on the wheel; that is, put it in motion.

Q. 21. Why not?

A. There was no continuous track there to operate the car on. We merely tested the springs with a load on them.

Q. 22. Did you photograph the trucks? if so, produce the photographs.

A. Mr. Philippi photographed the trucks under my directions.

Q. 23. Please produce the photographs.

A. I do so.

Q. 24. Which was taken first?

A. The truck, dismounted. The second was with the car mounted on the trucks.

Q. 25. Were these pictures taken while you were there, by Mr. Philippi?

A. The second was.

Q. 26. State whether or not they accurately represent the trucks?

A. As far as my general knowledge goes they do, accurately.

The photographs produced by the witness are offered in evidence.

1. The photograph of the truck alone is marked "Complainants' Exhibit, Pyott Photograph No. 1."

2. The photograph of the truck with car body on it is marked "Complainants' Pyott Exhibit, Photograph No. 2."

(The offer and receipt in evidence of the foregoing photographs are objected to as being incompetent and irrelevant.)

Q. 27. I observe that the links in photograph No. 1 are longer than those in photograph No. 2; will you please explain?

A. In the first photograph taken the links were  $5\frac{1}{2}$  inches from center to center; in the second photograph they were  $3\frac{3}{4}$ . They were shortened  $1\frac{3}{4}$  inches to give the knees or platform support beneath the car clearance on the truck as constructed with a wooden frame, and the general construction today of the steel frame is of less dimensions as to depth and gives that clearance.

Q. 28. You have stated that when you first built the trucks you placed a car body on them and a passenger load on the car body. Now, please state whether "Complainants' Exhibit, Pyott Photograph No. 1," was taken before or after you put the car body on the truck.

A. The truck without the car was taken first. Then the car was mounted and the second photograph was taken.

Q. 29. When was the change in the length of the links made?

412 A. When the car was mounted the knees or under bracing of the platform struck the general frame of the truck. I shortened the links  $1\frac{3}{4}$  inches to raise the body and obtain clearance. To change the length of the links we did not dismount the car body; we put jacks under the ends of the half-elliptic springs and substituted the shorter links.

Q. 30. Then what did you do?

A. At this time we placed the men in the car, which tested the depression of the springs to the amount of about 2 inches. The spring expanded in length from 39 inches to  $40\frac{1}{2}$  inches. This showed a severe strain on the suspension device between the beam and end of springs.

Q. 31. When was "Complainants' Exhibit, Pyott Photograph No.



2," taken, relatively to the putting the eighty men on the car? Was it before or after you put those eighty men on the car?

A. After.

Q. 32. I understand that the photograph No. 2 shows the condition of one of these trucks with the car body on, but after the load had been removed from the car body; is that correct?

A. That is the condition; yes, sir.

Q. 33. State what effect the car body and the load of eighty men had on the shackles.

A. It showed a straining action on the shackles. The arch spring had expanded an inch and a half under the pressure of this load, as stated before in the dimension I have given.

Q. 34. In which direction was the strain on the shackles exerted?

A. Longitudinally or lengthwise of the car. Ample provision had been made for the swinging of the bolster transversely.

Q. 35. Had this anything to do with not running the car on the tracks?

A. Well, I have stated there was no continuous rail to give it a test on or we would have given it.

Q. 36. State whether or not, in your judgment, it would have been safe to run this car with the eighty men on it.

A. I do not consider it would have been safe. In the propulsion of electric cars the motor propelling the truck acts as the first agent in moving; this requires to take up the slack between the bolster and truck frame before motion is given to the car and subjects a certain amount of strain on the springs.

Q. 37. You have said that the links were splayed apart, as shown in the photograph; state whether or not there would have been more splaying of the links if you had run the car with its load.

(The question is objected to as wholly incompetent, irrelevant and speculative.)

A. The action on the links, the springing action, rebounds, and that continuous action will crystallize those links, being held rigidly longitudinally.

Q. 38. Look at "Complainants' Exhibit, Pyott Photograph No. 2," and state if it shows a permanent outward set or play in the shackles.

413 A. The original set of the springs was  $3\frac{1}{2}$  inches; this photo shows the depression of 2 inches, extending the spring an increased length of  $1\frac{1}{2}$  inches, and shows a perceptible strain on the spring supports.

Q. 39. Did you make a written report upon this work and these experiments?

(Objected to as incompetent and irrelevant, as well as secondary.)

A. I made a report to Mr. Levy, complainants' counsel.

Q. 40. Can you produce it?

(Same objection.)

A. I had an original copy of it; at the present time my goods are on storage and I cannot trace the thing up.



(Mr. Levy, counsel for complainants, states that he has made a search in his office and is unable to find the letter in question.)

(Counsel for complainants produce a copy of the letter.)

Q. 41. Please read this copy, which I produce, and state whether or not it is a true copy of the letter which you wrote to Mr. Levy after you had made these experiments.

(Counsel for defendant objects to said letter and all reference thereto on the ground that it is incompetent, irrelevant and secondary in character, the alleged author thereof being now present and testifying. No objection is made by reason of the fact that it is a mere copy and not the original.)

A. So near as I can remember, it is a correct copy.

The letter in question is offered in evidence and is marked "Complainants' Exhibit, Pyott Report."

(The same objection by defendant's counsel.)

Q. 42. From whom did you receive directions to construct these trucks and make these experiments?

A. From the Brill Company's attorney, Mr. Rawle, was my first instructions in the matter.

Q. 43. Did you know for what purpose these trucks or your experiments thereon were to be used?

A. No, sir.

Q. 44. State whether or not you constructed them with your own judgment and skill, and without instructions or directions from other people as to how you were to do it.

A. I visited the drawing room of the Brill Car Works, saw the drawings and copy of the patent sent from the United States Patent Office, looked the subject over, carefully read the papers connected with it—meaning the patent and claims—made the sketch offered in evidence for details of the spring suspension.

I received no orders or instructions from any individual connected with the works. The drawings and description were extremely plain.

Q. 45. State what was the nature of your employment in the matter; that is, what you were directed to do when you were employed on the job by me.

A. At the time I performed this work I was in the employment of Senator J. E. Reyburn engaged on a patent air brake. I  
414 obtained permission from him to absent myself and give attention to the construction of this truck. I spent several days at the Brill Car Shops and directed the operations of building the same.

Q. 46. Under what general instructions from the counsel who employed you?

A. He gave me instructions to keep account of the materials, hours of labor, and direct the workmen in the construction of this truck individually.

Q. 47. Look at "Pyott Photograph No. 2" and state whether or not the half elliptic spring there has reached the complete flattening

or extended position, which it would assume if the car were carrying a normal or a heavy load.

A. They had not reached their extreme length, because they were originally  $3\frac{1}{2}$  set, and were now only depressed 2 inches in the photograph. The set is the certain amount of arch a spring has. An arch spring is capable of carrying a more varying load.

Q. 48. State whether or not, when you first completed the truck and there was no weight on the half-elliptic spring or the bolster, the shackles were parallel, or substantially so.

A. They were practically so; each hung exactly vertical.

Q. 49. Look at "Photograph No. 2," and state how much resiliency or capacity for acting as a spring is left in the leaf spring shown in the photograph.

A. The spring is ample for the work to be performed, a well-proportioned spring.

Q. 50. You mean that when you selected this spring it was a suitable spring for the purpose which you meant to use it?

(Objected to as leading.)

A. Yes, sir.

Q. 51. My question was different from that. I asked you how much capacity for acting as a spring is left in the leaf spring of "Photograph No. 2."

A. Well, it could have a capacity of from  $\frac{3}{4}$  to 1 inch, and still be a perfect acting spring.

Q. 52. If a load on the car should exhaust this remaining capacity, what would be the condition of the spring?

A. If the spring is unduly strong to support the load, it will depress beneath a straight line.

Q. 53. State whether or not you personally conducted these tests.

A. I was present and gave instructions in building, was there when the car was mounted on the trucks, changed the dimensions of the suspension links, as shown, and gave general attention to the work. I bossed the job.

Q. 54. I show you "Defendant's Exhibit, Thyng Truck," being a model offered in evidence by the defendant. Please look at it, and state whether or not, in your opinion, it conforms to the construction of the Thyng truck, as shown in the Thyng patent, No. 4276.

A. Not as shown in the drawing in the Patent Office it does not.

415 Q. 55. Please give your reasons for this opinion.

A. The difference in the general proportion of the springs being flatter, and it lacks height of arch. In railway car springs carrying varying loads, it is essential to have an extra height. It is not in exact conformity to the drawings or the patent as furnished. The differences are in the form of spring and clearance of bolster beneath the side rail of the frame.

Q. 56. What is the position of the bolster, as shown in the patent drawing, relatively to the lower edge of the side frame of the truck?

A. As stated, the Patent Office drawings show closer relation to the side rail.

Q. 57. Does it show contact in the patent?

A. Close clearance. In this case it does; yes, sir.

Q. 58. Do you mean that in the drawing of the patent before you it does show contact?

A. Yes, sir.

Cross-examination.

By Mr. DUELL, *de bene esse*, without waiver of objections:

(Defendant's counsel gives notice that at the proper time a motion will be made to strike the foregoing deposition from the record as being incompetent and irrelevant, and in many respects secondary, particularly in view of the fact that mere relative strength of parts between the disclosure of the patent to Thyng and the construction of the patents in suit, the claims relied upon whereof are directed to a specific portion of a complete truck is manifestly without the issues.)

X Q. 59. Are you the Louis Pyott who testified as to substantially the same subject matter to which your present deposition relates in the suit of *John A. Brill vs. The North Jersey Street Railway Company*?

A. Yes.

X Q. 60. I hand you "Complainants' Exhibit, Copy of Thyng Patent," and ask you whether Fig. 4 thereof shows a clearance, and to what extent, between the sides of the suspension shackle and the parts there above and there below pivotally secured there between?

(Objected to as indefinite.)

A. It is pivoted—the suspension links, to admit of side action, bolted firmly and no freedom of action lengthwise of the spring.

X Q. 61. Do you mean to say that you do not observe, looking particularly at the left-hand shackle of Fig. 4, a free distance longitudinally of the pivot pins between the sides of the shackle and the bolts pivoted there between equal at least to the thickness of one of these shackle sides?

A. There is an intervening space in the center, but the cheek plates or links are bolted firmly against their upper and lower supports.

(Counsel for defendant states that the inability of the witness to discern the obvious will be commented upon at the proper place and time.)

(Complainants' counsel object to such statements upon the record as improper.)

416 X Q. 62. I hand you "Complainants' Exhibit, Thyng Patent, Enlarged Drawing," and ask you to look particularly at the left-hand spring support of Fig. 3 thereof, and to state whether or not you observe a free and unobstructed portion of the pivot pins between the shackle side or cheeks and the upper and lower bolts

pivoted between said cheeks, and, approximately what amount of clearance there is.

A. There is apparently a slight clearance there, according to the blue print. There are no nuts or cotter pins or any mechanical device shown to hold the parts together.

X Q. 63. Is the exhibit in question a blue print copy of the original certified copy of the Thyng drawing filed as a part of the application of the patent?

A. To the best of my knowledge, it is.

X Q. 64. The end splay in action of a semi-elliptic spring would correspond to the original set or curvature thereof, would it not? That is, a semi-elliptic which is normally flatter or more nearly approximates a straight line, would be subject to less depression, and, therefore, end splay, than one which normally has a high degree of curvature, for instance, a  $3\frac{1}{2}$ -inch set, would it not?

A. It is a half elliptic spring which has been in question. If we substitute what is termed a plate spring, a flat plate spring, this varies the conditions, as stated.

X Q. 65. Would there be any trouble experienced in making such substitution, if desired?

(Objected to as immaterial.)

A. There would be no particular trouble in making such a substitution. In English practice they substitute a straighter spring than they do in this country.

X Q. 66. Now please answer cross-question 64, as asked.

A. I have answered it.

X Q. 67. Please describe the conditions which determine the amount of depression or end splay of semi-elliptic springs of different normal sets or curvature.

A. The varying load. That is the reason a semi-elliptic spring is more preferable to a flat plate spring.

X Q. 68. Will an English semi-elliptic—that is, one which has a slight degree of curvature normally—be subject to the same amount of end splay as one with a high degree of curvature; one, for instance, with a  $3\frac{1}{2}$ -inch set?

A. No, it would not be essentially the spring.

X Q. 69. How far can a semi-elliptic spring with a  $3\frac{1}{2}$ -inch set or curvature depress before it reaches the horizontal?

A. It can be depressed to almost a straight line, say 3 inches.

X Q. 70. How far can a spring with a 2-inch set depress?

A. Any spring will work down to almost a straight line.

X Q. 71. Then the ends of the 2-inch set semi-elliptic will not splay as great a number of inches longitudinally from the normal position as one with a  $3\frac{1}{2}$ -inch set, will it?

417 A. Not so great.

X Q. 72. Please look at "Complainants' Exhibit, Pyott Photograph No. 2." If a semi-elliptic spring having the normal curvature here shown were placed under a load, the end splay would not be very much, would it?

A. It varies with the varying conditions of the load, always.

X Q. 73. The spring supports of "Complainants' Exhibit, Pyott Photograph No. 1," will not be subjected to as great a strain by the splaying of the semi-elliptic, under the conditions existing when Pyott photograph No. 2 was taken, as the shorter spring supports or shackles, shown in the latter photograph, would they?

A. There would be but a slight difference or variation in the links.

X Q. 74. If the parts of the links were constructed more loosely, there would be a still less strain, would there not?

A. It would admit of a freer action.

X Q. 75. I hand you "Complainants' Exhibit, Brill Patent, No. 627,898," and ask you to look at the right-hand spring link of Fig. 1. If the bolt passing down through the stirrup fitted closely the hole in the latter, could the stirrup move lengthwise of the truck if the bolt remained perpendicular?

(Objected to as not proper cross-examination.)

A. The bolt, the spring and the stirrup all move in unison.

X Q. 76. Then the bolt would have to move longitudinally of the truck in order to allow the stirrup to move in the same direction, would it not, inasmuch as the stirrup and the bolt fit each other closely?

(The same objection, and, furthermore, that the witness has not been qualified to testify regarding the disclosures of the patent referred to.)

Complainants' counsel is requested to state whether the witness has been qualified by his long experience with trucks and with drawings to read the latter and tell about the operation in the former.

Complainants' counsel responds that the witness has given his testimony and the cross-examination should be limited to that, unless defendant desires to make the witness his own.

Defendant's counsel replies that the propriety of the cross-examination speaks for itself.

A. The bolt in connection with the stirrup is free to move up and down to admit of the action of the coiled spring. It is provided with a ball joint bearing when seated in the frame, to admit of universal swinging action. It swings in unison with the bolt.

X Q. 77. Can it swing out of unison with the bolt?

(Same objection.)

A. It cannot.

X Q. 78. Then it cannot swing longitudinally without the bolt swinging also in the same direction?

(Same objections, and as already answered.)

A. No, it has been previously answered. I have stated that they all move in unison—all three of them.

418 X Q. 79. When did you make the tests of what you have testified to as trucks correctly constructed after the disclosure of the Thyng patent?

A. In 1901, either in March or April; I do not remember the exact date.

X Q. 80. When was the matter of these tests first recalled to your attention, after the original test, four years ago?

A. In April, of the following year, 1902.

X Q. 81. When, subsequent to then?

A. Not until the present time.

X Q. 82. How do you know that the photographs marked "Complainants' Exhibit, Pyott Photograph No. 1," "Complainants' Exhibit, Pyott Photograph No. 2," are the ones taken under your direction at the time of the test?

A. I have not had the photographs in my possession. I can recognize the resemblance.

X Q. 83. I hand you "Complainants' Exhibit, Pyott Photograph No. 2," and ask you whether anyone was on the car when this was taken?

(Objected to as already answered.)

A. There was no person on the car; I have stated that before.

X Q. 84. In both of these photographs, Nos. 1 and 2, I note that the bolster is substantially flush with the side frames; that is, in contact. How did you flatten the semi-elliptic spring, as shown in photograph No. 1, in order to secure it to the shackles of photograph No. 2, which are  $1\frac{3}{4}$  inches shorter?

(Objected to as already testified to, and as not properly stating the testimony given.)

A. In making this change I placed a jack under each end of the spring, raised the ends of the spring, took off the  $5\frac{1}{2}$  links and placed  $3\frac{3}{4}$  links in their stead.

X Q. 85. Did you move the points of support of the shackles?

A. They remained in their original position.

X Q. 86. When the spring was flattened  $1\frac{3}{4}$  inches in the jacking process, how far from the normal position did the ends splay out?

A. There is no compression of the springs takes place in the case; the springs, bolster and car body move up together.

X Q. 87. How could the bolster move up, when it was already in contact with the side frame?

A. We jacked up the car body, placed a block on the bolster so as to relieve the contact of the truck, and bring the weight of the car to bear on the bolster; that gave the necessary clearance to jack the springs, bolster and body.

X Q. 88. When you had jacked up the ends of the semi-elliptic, were the shackles perpendicular or not? and if not, about how much off the perpendicular were they?

A. They hung perpendicular when loose, but when attached to the car with a weight the spring expanded in length, empty car, about 1 inch; loaded,  $1\frac{1}{2}$  inches.

419 X Q. 89. Referring to "Complainants' Exhibit, Pyott Photograph No. 1," in which the shackles appear substantially vertical and parallel, I ask you whether or not it is possible, when the ends of the elliptic are extended 1 inch, for the shackle connections depending from the same points of supports as before, to be vertical and parallel?

A. The spring was 39 inches in length, and the supporting point of the shackles are the same; the conditions are the same in each case, with slight variations in the angles of the links.

X Q. 90. Referring to "Complainants' Exhibit, Pyott Report," did you write or dictate the original of this yourself?

A. I wrote it myself.

Complainants' counsel offer defendant's counsel all suitable opportunity to inspect the Pyott trucks at the J. G. Brill Company Works upon proper notice.

Adjourned to meet Monday, June 19, 1905, at 11 o'clock A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, June 19, 1905.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner.  
Francis Rawle, Esq., for Complainants.  
Warfield & Duell, for Defendant.

JOHN N. AKARMAN, a witness called upon the part of the complainants, having been duly sworn, testified as follows:

By Mr. RAWLE:

Q. 1. What is your age, residence and occupation?

A. Fifty-one years of age; residence, Newark, N. J., and occupation, traffic superintendent and also assistant to the general superintendent, street railway department, Public Service Corporation of New Jersey.

Q. 2. State briefly the location of the roads, mileage and equipment of that company.

A. The system comprises practically all the lines in the north part of New Jersey, and south as far as New Brunswick, covering Paterson on the north, Jersey City on the east, New Brunswick and Somerville on the south, and the Oranges and Montclair on the west.

Q. 3. With a traffic arrangement extending to Trenton?

A. Yes, sir; the mileage of the system, single track measurement, is approximately 600 miles, and the equipment approximately about 1800 cars. We also have a miscellaneous equipment, comprising 200 snow plows and other electric cars.

Q. 4. State chronologically your experience in the street railway business.

420 A. I began as a conductor on the South Boston Railroad in 1873; I was employed there about two years. I next entered the service of the Third Avenue Railroad Company, New York city, in 1874, and was employed there until 1876; left there and went to Boston and entered the service of the Middlesex Railroad Company in 1876, and remained there until 1882. I occupied minor positions on the Middlesex road up to the assistant superintendent. Then I became the superintendent of the Charles River Road, Cambridge.



I left the Charles River Road to become superintendent of the Citizens Road, Worcester, Mass.; left there in 1887 to build the Biddeford and Saco Road, Maine. These were all horse railroads. Sold out there and became the general superintendent of the Essex Passenger and Irvington Roads in Newark, N. J., in 1888. These roads were consolidated under the title of the Newark Passenger Railway Company, of which I was the general superintendent, and here began my experience in electric street railway practice.

The first line we equipped was the Springfield Avenue Line, Newark. In 1892 I went back to Worcester and became general manager of the Worcester Consolidated Street Railway Company. This comprised the entire system of Worcester, Mass. I remained there eight years, having rehabilitated and changed the motive power from horses to electricity. Its system when I left there comprised about sixty-five miles and about 200 equipments.

At Worcester I operated from forty to fifty cars with single trucks; thirty cars with Maximum traction trucks, and the balance were other pivotal trucks. The single trucks were Brill's 21-E truck. The spring system of these trucks was a combination of spiral and elliptic springs.

The Maximum traction truck was the Brill truck, and the pivotal trucks were Brill's and Peckham. The pivotal trucks used were the Brill 27-G and the Peckham 14-B-3.

We had about, I think, seventy of the Brill trucks and we had some of the Peckham trucks, but the number I cannot tell you.

Q. 5. Your experience has covered electric street railroading from the beginning. Please state the history of the introduction and development up to the present time of electric street railway trucks, beginning with the earliest conversion of horse cars into electrically propelled street cars, and indicating the several types of trucks which have been successful and have been fully and generally adopted in the business.

(The question is objected to as incompetent, irrelevant, as constituting improper rebuttal testimony, and as being leading, containing assumptions of unproven and non-existing facts.)

A. The first attempt at equipping cars electrically was by putting the motors on the platforms of the old street cars. This was found to be impractical, and the first type of independent truck was brought out. The motors were placed upon the trucks so that the truck became an independent electric locomotive, on which the car body was attached. In the first form of truck the car body was cushioned on a spiral spring, the early form of car bodies being such as were formerly used as horse cars. The length of the car body was  
421 then increased from 16 feet to 18 feet and 20 feet, the load and carrying capacity being consequently increased proportionately. At the same time the speed was increased, which resulted in a rocking motion to the car. This was overcome almost completely by the Brill Company in the combination of an elliptic with a spiral spring. The effect of this combination of the slow-acting elliptic spring with the quick-acting spiral spring was to break up the



rhythm of motion, and it prevented almost entirely the rocking or galloping motion of the first form of single truck. The tendency all the time was to increase the length of the car, and this brought about the necessity of a double truck. The first forms of successful double truck was the Maximum traction truck, so-called. The conditions in the use of a double truck were very complicated. The car body had to be maintained within a certain distance of the ground to allow of ingress and egress of passengers. The cars had to be limited in width on account of the narrowness of the streets, so that the truck had to be narrow in construction and to be built so that the car body would hang within a limited distance of the ground, and so constructed that when turning curves and radiating under the car body it would not come in contact with the side sills of the car. The Maximum traction truck was produced to meet these particular requirements. The construction of the Maximum traction truck was: A pivotal truck having one pair of wheels larger than the other, the pivotal point being nearer to the axle of the larger wheels, so that the greater part of the weight, about 75 per cent., was carried on the larger wheels to which the motors were attached, the smaller pair of wheels being "idle" wheels.

There were two objects to be desired and achieved in doing this: the first was that the larger wheels would radiate under and between the sills, the "idle" wheels passing under the sills; and the second object was to obtain as much traction as possible, having one motor attached to each truck. This type of truck was very efficient until longer cars were used. This truck was first introduced by the Brills in 1889; I think it was when we first used it—1888 or 1889. We first introduced it on the Newark line in 1889; on the Springfield Avenue line and on the Worcester line it was adopted as our standard form of double truck in 1892, when the road was changed from horse to electricity. For cars up to a certain length this truck was and is today generally used. Up to the use of longer cars it was almost universally used all over the country; it met all the conditions of narrow streets, gave sufficient traction, and operated perfectly around curves, and was in every way an acceptable truck for the type of cars used.

The demand was being constantly made for longer cars—cars to be run at higher speed, so that it became necessary to use a different type of truck. The requirements of speed demanded greater motor capacity, and a truck had to be devised on which two motors could be placed; that is, four motors per car. As a result, the center pivotal truck was brought into use. It was found in using the Maximum traction truck at increased speed that cars were frequently  
 422 derailed on account of lack of weight on the "idle" wheels, so that this experience contributed toward placing an equal amount of weight on all the wheels of the truck. One of the imperative requirements of a pivotal truck was to bring the wheels as close together as possible to enable the truck to radiate between the sills, this form of truck being a center pivotal truck.

The requirements were very severe, and there were so many things to be considered to meet these requirements—the weight of the car,

the weight of the load, the increased speed, with strains incidental to the same, and also the strains incidental in starting the load, both on level and on up grade, required a truck of exceeding strength which had to be mechanically perfect. The length of the car body being increased to sometimes 40 feet, the weight of the same being approximately 12 tons. A car of this type, carrying a proportionately increased load, approximately 10 tons; the increased weight of the motors also added to the necessarily increased strength desirable in a truck, and also the increased strains to which the truck would be subjected.

The speed at which the cars were run was increased from 8 miles to 20 and 25 miles in city practice, and to 40, 50 and 60 miles in suburban practice.

At the present time we are operating a line from Jersey City to Trenton, N. J., 72 miles in length. In the cities we are limited to a speed not exceeding 8 miles an hour, and on the last 24 miles of the road, which is over a private right of way, we make the entire distance, together with stops, in one hour. The average speed for the entire trip is 14 miles per hour.

I first knew this new type of truck in my own experience on the Worcester Consolidated Street Railway, using the same on our suburban lines. I afterward used the truck on the Elizabeth, Plainfield and Central Jersey Railway, while I was general manager of that company. We are using a great many of these trucks on the roads of the underlying companies controlled by the Public Service Company.

The pivotal trucks that I have reference to in the preceding paragraphs, being the Brill 27-G and the Peckham 14-B-3, which are practically identical in construction, I mean from a practical street railway man's standpoint, on a difference of \$5 in price, I would just as leave have one as the other.

(The foregoing answer is objected to, and notice of motion is given to strike the same from the record upon the ground specified in the foregoing objection, and further, as being an obvious effort to inject a eulogy of the Brill Company into this case and the history of car trucks; and also as being an obvious effort to cast a halo about the word "type.")

Q. 6. To what extent have trucks of this new type, such as 27-G and Peckham 14-B-3, gone into general use?

A. On roads where a car body exceeding 25 feet in length is used, these trucks are almost universally used. I should think at least 80 per cent. of all trucks being of these two types.

Q. 7. Taking the city and suburban street railway business throughout the country (but including elevated railways), 423 what types of trucks substantially cover the entire use in this country? I mean pivotal trucks.

(Objected to as incompetent, irrelevant and leading.)

A. The two types previously mentioned, the Brill 27-G and the

Peckham 14-B-3. That would include also the Maximum traction truck in pivotal trucks.

Q. 8. You mean that, considering pivotal trucks only, the practice of the country is divided between the Maximum traction truck and the trucks of the type represented by 27-G and 14-B-3?

(Same objection.)

A. I do.

Q. 9. Do you know about what year the general introduction of the 27-G type of truck began?

(Same objection.)

A. Well, it was some time previous to my using that type of truck; I think about the year 1895.

Q. 10. Do you know of any cities where only the Maximum traction type of truck is used, and if so, what conditions makes its use there necessary?

(Same objection, and further, as being indefinite, no distinction being made between the various makes of Maximum traction trucks on the market.)

A. The Maximum traction truck is used in New York city, and its use is made necessary by the closeness of the tracks to each other, and also to the narrowness of the streets and consequent turning from one street into another.

Q. 11. What are the truck conditions on elevated railways? Are they the same as on surface roads?

A. They are not. The practice on elevated roads is identical with the practice on steam roads. The car body can be placed any distance required from the ground, so that the truck can radiate freely under the sills. Also the distance between tracks is such that the side overhang of the car will not in any way interfere with the passing car.

Q. 12. What concern first introduced the non-pivotal type of truck with the combined spiral and elliptic springs?

(Objected to as incompetent, irrelevant and improper rebuttal testimony from any standpoint.)

A. The J. G. Brill Company, of Philadelphia.

Q. 13. You have sketched the history of electric street railway trucks. Will you state whether or not that art learned anything from the steam railroad truck art, giving your reasons for your answer?

(Objected to as incompetent and irrelevant, and as containing an assumption in the use of the term "art.")

A. It did not, the conditions and requirements being entirely different. The steam railroad truck being a truck that was hauled in practically straight lines, the strains on this type of truck and requirements were entirely different from what they are in a truck

424 that has to be propelled by machinery attached to it. The electric truck's strains were those incidental to the movement of a large weight attached to one part of the truck by means of power attached to the axles. These strains were those incidental to overcoming the inertia of a large body standing still. Again, the turning of short radius curves, and thereby overcoming the centrifugal force, brought about other strains that were not developed in steam railroad practice. Again, the width of the car required a narrower form of construction than used in steam railroad practice, and also the requirement in length of the truck had to be essentially different from trucks used on steam railroads.

Again, the requirements in electric practice of being compelled to hang the car body within a given distance of the ground, which requirement was made necessary by a limit to the number of steps that could be used in street railway practice to enter and leave the car, was entirely different from the requirements in steam railroad practice.

The electric truck had to be so constructed as to properly accommodate the motors which are hung on the axle and suspended from the frame of the truck.

Q. 14. State whether or not there are any differences between the electric practice and steam practice growing out of the turning of sharp curves at speed, change of grade and greater inequality of track conditions on electric roads, leading to strains which do not exist in steam practice.

(Objected to as incompetent, irrelevant and as containing an assumption of fact.)

A. The conditions are entirely different. In steam practice the curves are all very slight, being of very long radius, and the direction is overcome by changing the center of gravity by raising the outer rail, so that there is practically no lateral strain in turning curves in steam railroad practice. In electric practice the curves are of very short radius, the direction of the car being taken care of by guard rails, the center of gravity remaining the same, as the tracks are on the same plane. This means great friction and a great lateral strain.

Q. 15. In steam practice does the car haul the truck or the truck haul the car, and how is it in electric practice?

A. In steam practice the car body is first set in motion and the truck is hauled; in electric practice the truck is first in motion, and imparts said motion to the car body, which is attached to the upper part of the truck. This brings out very severe strains on the truck, being increased largely in proportion to the load carried on the car and to the weight of the car body.

Q. 16. In steam practice at what point of the structure does the movement of the car body, when the locomotive starts, impart motion to the truck structure?

A. The bolster is attached to the car body and moves with it until it strikes the transom, which is a part of the truck structure, and the motion is imparted downward to the wheels; in electric practice the

425 wheels are first set in motion, and the motion is imparted upward to the car body. This is an exact reversal in the manner of imparting the motion.

Q. 17. In electric practice, during the moment before the transom strikes the bolster and begins to move the inert mass of the car body, state whether or not there are any strains developed on the spring system.

A. There are, as the motion is imparted upward through all the component parts of the truck before reaching the car body.

Q. 18. Look at the white metal model of the Peckham 14-B-3 truck in the case, and state at what point on the spring system these strains of starting the car take place.

(Objected to as incompetent.)

A. At the end of the elliptic springs, where the hanger from the truck is attached to the same.

Q. 19. How serious is this strain with one of the big car bodies, fully loaded, you have spoken about?

A. It is one of the most serious that the truck is subjected to, and depends proportionately upon the weight of the car body and the load. The entire strain of overcoming the inertia being brought to bear at this point.

Q. 20. In the Brill 27-C truck, how is this strain provided for or cushioned against or taken up?

(Same objection.)

A. By a link suspension, that acts as a cushion to the strain.

Q. 21. In what direction relatively to the length of the truck does this strain tend to swing the links?

A. It tends to swing the links forward, the truck moving forward and being in motion before the motion is imparted to the car body.

Recess until 2.10 P. M.

Q. 22. State whether or not you consider it of importance that these strains of the load and of starting should be mechanically provided for and cushioned.

A. I do. I think it is of the greatest importance that such provision be made.

Q. 23. In the model of the Peckham 14-B-3 truck here present, state whether or not you find them mechanically provided for and cushioned.

A. I do; first in the compression of the springs and in the lost motion between the movement of the trucks and the subsequent movement of the car body. By spring, I mean the spiral spring sustaining the link.

Q. 24. Look at the model of the Thyng truck and state whether or not you find provision therein for such strains and a cushioning against such strains.

A. I do not.

Q. 25. Look at the links on this Thyng model and state what, in your opinion, would be the effect on them if put under a long car

body with a full load, as you have mentioned, and run at from twenty-five to forty miles an hour.

426 (The question is objected to as incompetent, irrelevant and speculative.)

A. Owing to the rigidity of the construction consequent upon the lack of cushioning the strains would result in the crystallization of the metal composing the hanger, and consequent breakage.

Q. 26. You have spoken of strains in starting. State whether or not there are strains and what strains due to rounding sharp curves, to sudden changes of grade, and to irregularity in the alignment of the track.

A. In rounding curves there are two distinct classes of strains. The first strain is incidental to the centrifugal motion or change of direction of the car, and the second strain is brought about by overcoming the friction incidental to changing the direction of the car by means of grooved rails, which guide the wheels around the curves.

There are also strains incidental to propulsion of the car up any grade, which are very much increased by the steepness of the grade. These strains are all longitudinal strains in the direction of the length of the car body or truck frames.

There are also side strains or lateral strains incidental to irregularities of alignment.

Q. 27. In the type of truck here in suit, state whether these various strains are mechanically provided against and properly cushioned.

A. They are, by means of the swing bolster and spring link motion.

Q. 28. In what directions must the spring links swing in order to meet these various strains?

A. Forward and backward in the direction of the length of the car body.

Q. 29. I referred not only to the starting and stopping strains, but to the strains brought about by rounding curves and by irregularities in track alignment.

A. The lateral strains are taken up and provided for by the bolster.

Q. 30. And in what direction do the links swing under these lateral strains at their lower ends?

A. They also swing in a lateral direction, so as to provide for cushioning of the strains.

Q. 31. Please look at the Thyng model, and state whether or not you find mechanical provision made in that construction to take up and cushion these various strains of starting, stopping, etc.

A. I do not.

Q. 32. Based upon your life-long experience in the trolley business, state whether or not you consider the construction of this Thyng model such as would meet the modern practice that you have described.

(Objected to as manifestly irrelevant.)

A. I consider the device, as shown in the model, as crude and im-



practicable, and not adaptable to the practice or requirements in electric railroads.

Q. 33. Please look at "Defendant's Exhibit, Buck Truck," and state whether or not that construction is suitable for modern electric street railway practice.

427 (Same objection, and as being without the issues produced by the claims relied upon of the patents in suit.)

A. It is not practicable for many reasons; the construction precludes the equipping with electric motors; it also necessitates too great a distance between wheel centers, and is in every way incomplete and not mechanical, and in no way adapted to the requirements.

Q. 34. If you shortened the wheel base in the Buck truck, what would be the effect on the longitudinal half-elliptic spring in regard to their length?

A. They would have to be shortened to the full extent, to which the wheel base would be shortened.

Q. 35. State whether or not in that case these shortened springs would continue to act as efficient springs.

A. They would not.

Q. 36. You have stated here the practice of your present company in regard to high speed with heavy cars and heavy loads; state whether or not such service would have been carried on by you with the use of any trucks known to the trade before the introduction of the truck of the type here in suit.

(Objected to as incompetent, irrelevant and speculative.)

A. The present service could not be carried on without the truck being developed to its present state. There were three distinct epochs in the development of trucks, the first being the production of a truck, by that I mean an independent piece of mechanism separate from the car body, to which the electric motors could be attached and become part of; the second step in the development of trucks was the production of trucks of the Maximum traction type, which type of trucks met the requirements up to a certain length of car body run at a limited rate of speed; the third epoch consisted in the development of pivotal trucks of the type of those in dispute.

Q. 37. You have hitherto referred to the introduction of non-pivotal trucks of increased length, having combined the spiral and elliptical springs for the prevention of oscillation. Where does this improvement come in in connection with your last answer, historically?

(Objected to as incompetent and irrelevant.)

A. This constitutes the advancement of the art of truck building in what I term the first epoch.

Q. 38. State whether or not, in your opinion, you consider the truck of the type here in controversy as constituting from your practical standpoint an advance in the truck art.

A. I consider the present type of truck in controversy to be the highest development at the present time in the art of truck manufacture.

Cross-examination.

By Mr. DUELL, without waiver of objections:

X Q. 39. Do you consider that a mere difference in degree, whether applied to trucks and the various parts thereof, or "generally to mechanical constructions, constitutes an essential difference"?

428 A. The only way I can answer that question is that it might do so. It would have to be a qualified answer—it might do so and it might not do so. It would depend in what the difference was in—in what component parts of the trucks.

X Q. 40. How many trucks approximately are there in use today upon electric railways in the United States?

A. That is a matter I cannot possibly answer. I can tell you the number I know of.

X Q. 41. How many do you know of?

A. I suppose there are at least 50,000 equipments, one single truck or two double trucks constituting an equipment.

X Q. 42. About how many double trucks in America?

A. I should think about 60,000, and there are about 20,000 single trucks, I should think. It is a guess; I am not sure of that.

X Q. 43. How do you know that "considering pivotal trucks only, the practice of the country is divided between the Maximum traction truck and the trucks of the type represented by 27-G and 14-B-3"? In other words, aren't you guessing there?

A. No, my knowledge of the use of double tracks is had from visiting many of the large cities, and also by conversations with managers of street railway properties. From the consensus of opinion with street railway men with whom I have conversed, and from my personal observation, I base the statement quoted.

(The foregoing answer, and that to question 8 to which it relates, are objected to as constituting hearsay evidence, and as comprising matter of opinion.)

X Q. 44. When was the M. C. B. type of truck first used upon electric railways?

A. To my knowledge, within three years; in making this answer I am speaking of positive knowledge.

X Q. 45. You have testified that you thought the 27-G truck began to be generally introduced about the year 1895. Are you sure about this?

A. That is a matter of recollection. I bought some of these trucks, to the best of my recollection, in 1897. I think the truck was brought out a year or more previous to that time.

X Q. 46. Then you are not aware that a previous witness of complainants', Walter S. Adams, has testified that the first trucks of the kind above mentioned were made in the year 1896?

A. I am not. I didn't hear his testimony, and I had no conversation with him.

X Q. 47. Are you aware that center-bearing pivotal trucks having wheels of the same diameter are used in New York city, in addition



to the Maximum traction truck? and if you know the names of any, you might mention them.

A. I know of no center pivotal trucks with wheels of the same diameter being used in New York city.

429 X Q. 48. What kind of trucks are being used on the Third Avenue line there?

A. I do not know; I do not remember ever having observed the trucks on the Third Avenue cars.

X Q. 49. You have stated that "on roads where a car body exceeding 25 feet in length is used" trucks of the type of 27-G and of the type of Peckham 14-B-3, "are almost universally used." "I should think at least 80 per cent. of all the trucks being of these two types." You hardly know this of your own knowledge, do you?

A. I do not know it positively. My estimate is based upon roads that came under my personal observation and from conversations with managers of different street railway property.

X Q. 50. The fastest speed which you make over any section of the trackage of your company is twenty-four miles an hour over a private right of way, is it not?

A. It is not. We make a very much higher rate of speed at times. That is the highest rate of speed maintained for a distance. Sometimes the cars have made a speed of forty or fifty miles over this same territory.

X Q. 51. How recently has your company purchased Brill 27-G trucks? and in this connection you might state whether you are thoroughly familiar with the link suspension thereof.

A. We bought a large number of trucks from the present company, with which I am identified, last year, and I believe we have bought some this year. I am familiar in a general way with the link motion of the Brill trucks.

X Q. 52. Were these 27-G trucks?

A. They were.

X Q. 53. Do you remember whether or not the semi-elliptic springs were suspended from the side frames by a connection comprising a metal band or strap passing over and around the side frame?

A. I do not recall the particular construction. I don't remember the construction of the attachment of the semi-elliptic spring to the side frame.

X Q. 54. Would a truck precisely the same in all essential particulars to the 27-G truck be practical and operative if, instead of a semi-elliptic spring, it had a rigid equalizer bar secured to the links?

A. It would not.

X Q. 55. Why not?

A. Because you would have no elasticity which the spring gives, which is necessary in a practical truck?

X Q. 56. Would you get it from the spirals used in connection with the links?

A. You would not. The spirals in connection with the links are only used to cushion the strains on the truck.

X Q. 57. Then they are not used to give spring action to the car body, and if not, couldn't they be?

430 A. They are not used to give spring action to the car body. They serve to cushion the car body. They could not be properly used to give spring action unless they were differently constructed. They would have to be very much longer, which would necessitate raising the car body above the present plane at which it is maintained.

X Q. 58. Then, in order to provide sufficient spring motion, you would have to substitute for the rigid equalizer which I have mentioned a semi-elliptic spring?

A. That is the purpose of the semi-elliptic spring in this type of truck, to get what is commonly known as an easy-riding car.

X Q. 59. In other words, if one wishes spring motion in some parts of a truck, they have to put in a spring of a suitable character; am I correct?

A. They have; and the character of the spring is greatly dependent upon the conditions of construction. You could use the semi-elliptic spring, and carry it to such a position as it is carried in the Brill truck, or the Bemis truck, without increasing the distance from the under side of the car body and the ground.

X Q. 60. How many cars do you use four motors on?

A. We have approximately at present about 600 four-motor equipments, out of about 1200 equipments.

X Q. 61. In pivotal trucks, about how much clearance is allowed for the bolster between the transom guides?

A. Well, it has a small amount of play, but the exact distance I cannot tell you. I should think it had a couple of inches from my recollection, but whether it is an inch or two inches I cannot positively say.

X Q. 62. It might be less, I presume.

A. Yes, it might be less.

X Q. 63. What is the object to be obtained by allowing clearance?

A. To provide for a perpendicular motion, as well as a slight longitudinal motion.

X Q. 64. Referring to "Defendant's Exhibit, Model Thyng Truck," you have testified that owing to the rigidity of the construction of the shackles, a crystallization of metal would result from use. Would this result if there were an abundance of provision for longitudinal extension or elongation of the elliptic?

A. Crystallization will occur where there is lack of provision for cushioning the strains or blows incidental to the use of a car truck.

X Q. 65. Then, with free movement in all directions, crystallization of the shackles would not result, would it?

A. Free movement and a proper provision for taking care of the jolts, which are the same as hammer blows, would lessen and, with complete provision, prevent crystallization.

X Q. 66. Please look at "Defendant's Exhibit, Peckham 14-B-3 Truck," and state whether or not you find any provision tending to restrict longitudinal motion of the links.

A. I do not see anything there which restricts longitudinal motion.

431 X Q. 67. What about the pin located longitudinally of the truck and passing through the upper eye in the links?

A. It has no bearing on the longitudinal motion; the combination constitutes a lateral and longitudinal motion. The longitudinal motion is taken care of by the manner in which the hanger is attached to the spring and by which the whole thing is attached to the truck frame. The lateral motion is partially provided for by the manner in which the upper part of the attachment is arranged; I mean the manner by which the two parts of the links are joined, and also by the manner by which the link is suspended from the truck frame; that is, by the manner in which the link is allowed to move laterally and longitudinally from the truck frame.

X Q. 68. It is your conception, then, that free longitudinal motion of the semi-elliptic and the links connected therewith was intended by the construction? I mean particularly unrestricted freedom of elongation of the semi-elliptic.

A. Yes.

X Q. 69. Then, why if absolutely unrestricted movement were intended, were not the pins in the cups at the top of the spiral upon the side frames passed through the upper eye of the links in a direction opposite to that which they now have, namely, transversely of the truck?

A. I don't think the manner of attaching the link to the cap over the cushioned spring which sets in the frame from the top has any bearing on either the lateral motion or the longitudinal motion of the elliptic spring, as the compression of the spiral spring would allow of both lateral and longitudinal motion of the elliptic spring. However, the link was suspended from this top cap.

X Q. 70. Do Maximum traction trucks make provision for both longitudinal and lateral motion of the car body or its spring support, if any?

A. The motion in a Maximum traction truck is provided for in a different manner; I mean its longitudinal and lateral motion. It is provided for by the play of the journal box in the jaw of the frame.

X Q. 71. Then, car bodies upon Maximum traction trucks have longitudinal and lateral motion?

A. To a limited extent.

X Q. 72. What first made these two motions desirable in electric street railway practices? I mean longitudinal and lateral.

A. To prevent rigidity and consequent reflection of the jars and blows incidental to operation of an electric car, the freedom attained by this slight lateral and longitudinal motion acting as a cushion.

X Q. 73. Your answer applies equally then to railway traffic from the time when electricity was first used as a motive power. Was there nothing especial which called for a longitudinal and lateral motion similar to that possessed by the Brill 27-G trucks?

432 A. There has always been provision made for lateral and longitudinal motion in every well-constructed truck. The provision for acquiring this motion is different in different types of trucks.

X Q. 74. Then longitudinal and lateral motion of car bodies is as old as electric railroading itself?

A. It is as old as the first types of single trucks that made provision for such motion.

X Q. 75. When were single trucks first used on electric railways?

A. To my knowledge, in about 1889; that is, the first form of a single truck. I might add that that was not a satisfactory form of single truck; it was the beginning of the art of the manufacture of them.

X Q. 76. Referring to "Defendant's Exhibit, Model Buck Truck," please state why the semi-elliptic springs at the sides thereof would not still be springs if shortened, say to one-half their length.

A. If constructed as they are at present, they would be so rigid if shortened as suggested that they would practically not be springs.

X Q. 77. Even if this were so, couldn't they be easily made more springy, or livelier springs substituted?

A. Not, and maintain the necessary strength.

X Q. 78. Do you mean to say that *that* these springs could not be shortened to the extent indicated and still have an abundance of strength, coupled with spring action?

A. Most emphatically, yes.

X Q. 79. Do you consider that the substitution of metal for wood; in other words, the substitution, broadly, of stronger parts for weaker are matters of degree or not?

(Objected to as irrelevant and vague.)

A. I do.

They would be matters of construction, and act as a preventive of the result.

X Q. 80. Wouldn't shortening the side semi-elliptics of the Buck model, and shortening the wheel base, if desired, be matters of degree?

(Same objection.)

A. They would be matters of construction, and act as a preventive of the result.

X Q. 81. Won't you admit that they would be mere matters of degree, in relation to the present construction?

(Same objection.)

A. They would completely change the present construction. You could not shorten the spring without doing away with its effectiveness as a spring under the conditions.

X Q. 82. Please answer my question yes or not as asked.

A. No, I will not admit it. If you modify the construction of the model of truck form and shorten the spring so that it will lose its elasticity, you might as well have a solid side bar as a rigid spring, which is an entirely different proposition from that shown in the model.

(With the exception of the first sentence, the answer is objected to, on the ground that counsel for complainants, while the witness was

speaking of the record to counsel for defendant, instructed the foregoing statements made by the witness to be placed thereon, and motion is made to strike the same from the record.)

433 X Q. 83. Your objection in brief, then, seems to be that if the side semi-elliptics are shortened, they will become rigid bars. Is that the substance of your objection?

A. That is only part of my objection to the type of truck as shown in this model. The truck shown here could not be used in electric street railway practice with any reasonable modification. A serious objection to this type of truck is the manner in which the load represented by the car body and passengers therein is carried, it being carried on the weakest point in the truck, the same being midway between the solid side frames of the truck.

X Q. 84. Is that the substance?

A. I confess I do not see the purport of the question.

X Q. 85. Is that all?

A. In answer to that I will say that the model shown is what I generally term a freak truck, having no single qualification to recommend it.

X Q. 86. Don't you think you are rather partisan?

A. I don't. I don't think you could find a single railroad man in the country who would take a given number of those trucks as a gift, providing he was compelled to operate them; I wouldn't.

X Q. 87. What other suits have you testified in, on behalf of the Brill Company, particularly any in which Peckham trucks have been involved?

A. I remember testifying in one other suit for the Brill Company, pertaining to the Brill 21 truck and its modifications. This was against the Third Avenue Railroad on Bemis trucks. It was quite a number of years ago.

X Q. 88. Looking at the Buck truck, is not a spring suspension provided which allows longitudinal and lateral motion and motion in all resultants of these directions?

A. In the model shown there is motion in every direction provided for in the manner in which it is provided.

JOHN N. AKARMAN.

Sworn to and subscribed before me this nineteenth day of June, 1905.

SAMUEL BELL,  
*Sp. Examiner.*

HARRY H. ADAMS, a witness called upon behalf of the complainants, having been duly sworn, testified as follows:

I am thirty-four years of age; I live at Baltimore, Md., at No. 714 Lenox Street. I am superintendent of shops of the United Railways and Electric Company of Baltimore. This company covers the entire system of street railways in Baltimore and surrounding parts. It has about 380 miles of trackage and about 1555 serviceable equipments.

Q. 1. State what experience you have had in electric street railway concerns.

434 A. My first connection with electric practice was in 1893, with the Consolidated Traction Company of New Jersey, where I first started in to get my first practical experience. This was after graduating from Stevens Institute, Hoboken, N. J.

I held various positions in that road, such as foreman of the electrical and truck department and assistant to the electrical engineer, and finally the position of master mechanic. I held this position until I left the North Jersey Street Railway Company, as it afterwards became, the last of December, 1901.

Upon the North Jersey Street Railway system, which has since become the Public Service Corporation of New Jersey, I had under my care various type of trucks, both single and double. Some of these were manufactured by the Peckham Manufacturing Company, others by the Brill, and some by the Bemis and Maguire Companies. I had some of the Maximum traction trucks of both the Peckham and the Brill Company's make; also some of their double trucks with four wheels, all of the same diameter; that is 33 inches.

The numbers of the Peckham double trucks of this latter type were the 14-B-3, and of the Brill type were the 27-G.

Q. 2. State your next experience.

A. In 1902 I took the position of superintendent of shops of the Baltimore roads, and have held that position up to the present date. I have had under my care in the double truck principally Maximum traction trucks of the Brill and the Lord Baltimore type.

We do not operate any Brill 27-G or Peckham 14-B-3 on our system up to the present time. The reason that we have had to use Maximum traction trucks upon the Baltimore system previous to this time is that the gauge of our track is 5 feet 4½ inches, and as we have been limited in width of car body, we have been required to use the Maximum traction truck in order to get the car body down low enough in order to give a reasonable step to the passengers to the platform. However, the conditions in Baltimore have changed somewhat since the fire and we have been able to widen our track centers in some cases, and by designing a car body with the top of the floor dropped below the top of the side sill we have been able to figure upon using double trucks with four wheels all of the same diameter; generally of the type of the Peckham 14-B-3 and the Brill 27-G.

Our specifications are now out for 200 cars upon which we will use trucks of the last-mentioned types, or similar thereto.

Q. 3. What was the first type of pivotal trucks of which you had any personal experience in street railway practice?

A. That was the Brill Maximum traction truck. That was in the latter part of the year 1894.

Q. 4. Previous to that had your company used any pivotal trucks?

A. I believe they had some of the old type Brill Maximum traction trucks, with the built-up side frames.

Q. 5. Have you, within the last 8 or 10 years, observed  
435 any changes in the street railway practice and its requirements in relation to speed, motive power, length of cars, etc.?

A. The tendency has been with most of the roads to increase their speed and also the length of the car body, and the practice in regard to electrical equipments or motive has been to go to the four-motor equipment per car.

Q. 6. What are your longest car bodies?

A. I have had experience with car bodies which have been 30 feet 5 inches and 32 feet respectively, over corner posts. The former in Baltimore, and the latter upon the North Jersey Street Railway Company's system.

Q. 7. What is your highest speed?

A. At present, we do not get a speed of much more than 20 miles per hour, maximum. We are contemplating, however, the installation of some equipments that will run at least 40 miles per hour.

Q. 8. What connection has larger car bodies with the adoption of four motors per car? and, in this connection, bear in mind the heavier grades of street railway practice.

A. With the four-motor equipment, it is possible to take care of a heavy car body and distribute the power unit so as to get the best possible results from traction and acceleration. The four-motor equipment is much to be preferred over equal horse power in two-motor equipment.

Q. 9. What percentage of traction do you get in this type with four wheels of the same size?

A. With the four-motor equipment we practically get 100 per cent. traction.

Q. 10. How about Maximum traction trucks?

A. In the Maximum traction truck we get about 70 per cent. upon the driving wheels.

Q. 11. Compare the two types with respect to pounding on the rail joints.

A. There is considerably less pounding upon the track with the four-motor equipment.

Q. 12. What about the danger of derailment with the respective types?

A. There is a great deal more trouble with respect to derailments with the Maximum traction truck than with the other type. The reason for this is the tendency for the small wheels to mount the rail.

Q. 13. Besides the Maximum traction type of truck and the type represented by Brill 27-G and Peckham 14 B-3, do you know of any other type of pivotal truck in general use, or even considerable use?

(Question is objected to as incompetent and irrelevant.)

A. There are other types in use, but in my experience, those which are generally in use are the Peckham 14-B-3 and the Brill



27-G, or types similar; also the Maximum traction truck of these respective makers.

Q. 14. In using the words "or types similar" in this answer, what had you in mind?

436 A. I had in mind trucks made by the Baltimore Car Wheel Company, and some of the trucks which are built on the Master Car Builders' type.

Q. 15. Where have you seen the Baltimore Car Wheel Company trucks?

A. My principal information in regard to this type of truck has been obtained from cuts I have seen of their make of trucks.

Q. 16. Does your company use any of them?

A. Our company does not use any of their trucks, double trucks, with four wheels all of the same diameter.

Q. 17. Do you know of any Master Car Builders' type of trucks in use on your road or on the streets of any other city?

(Objected to as incompetent and irrelevant.)

A. We have no trucks of this type on our system, and I do not remember any particular city where they are using trucks of this type for strictly city service.

Q. 18. Do you consider the M. C. B. type suitable for strictly city service?

(Objected to as immaterial.)

A. I consider that it would be possible to use it for this kind of service, but personally I would prefer trucks of the type of the 14-B-3, made by Peckham, or the Brill 27-G.

Q. 19. In street railway practice, is the present tendency among the companies towards the last-mentioned type or towards the Maximum traction type, in ordering new equipments, outside of the cities where the conditions impose the use of the Maximum traction type?

(Objected to as incompetent and irrelevant.)

A. I think the tendency is to get away from the Maximum traction truck in every case that it is possible to do so.

Q. 20. What do you consider the practical advantages of the type now here in suit over the Maximum traction type?

(Same objection, and as containing an assumption.)

A. The ease of riding is one of the principal features of this type of trucks, due to the fact that it is possible to use a better spring arrangement. Then the possibility of using four motors as against two, allowing for a considerable gain in the acceleration of the car; also the getting away from the tendency of the Maximum traction to derail.

Q. 21. What is the importance of a short wheel base in trucks having wheels all of the same size?

(Same objection.)

A. With a short wheel base it is possible to radiate the wheels



between the side sills of the car without necessarily raising the car to an objectionable height in regard to the step.

Q. 22. With a heavy car and heavy load coming on the half-elliptic springs in this type of truck, what effect has it on this spring?

A. It throws considerable strain upon the spring.

Q. 23. What effect as to flattening it?

437 A. It has a tendency to flatten the spring and consequently extend the ends.

Q. 24. What motion does this impart to the spring links?

A. The tendency is to push them away from the center.

Q. 25. In what direction relatively to the length of the car?

A. In the same direction as the length of the car.

Q. 26. State whether or not in operating a car over a rough track this tendency to flatten the springs and splay the spring links is increased.

A. It is considerably increased, depending upon the roughness of the track.

Q. 27. In starting a car, what strains are there on the spring system, and at what point do they come?

A. The motion of starting would be transmitted from the truck frame through the links to the half-elliptic springs, and from the springs the motion would be transmitted to the truck bolster and until the same came in contact with the cross bars or transom bars of the truck.

Q. 28. At what particular point would this strain on the parts be most severe?

A. Upon the links of the truck which suspend the half-elliptic.

Q. 29. Do you mean at the point of connection between the spring links and the half-elliptic springs among other places?

(Objected to as leading. )

A. I should think that this would be one of the points of greatest strain.

Q. 30. In standing that strain, state in what direction it tends to throw the lower end of its spring link relatively to the length of the truck.

A. It would tend to throw the lower portion of the link backward in regard to the direction of motion.

Q. 31. State whether or not in the model of the 14-B-3 truck before you this strain is cushioned against.

A. I see nothing in the model to directly cushion this strain.

Q. 32. What is the purpose of the spiral springs resting on the upper edge of the truck side beam and supporting the links?

A. It is part of the spring arrangement of the truck and would necessarily have an effect of taking part of the load or weight of the car body at this point in addition to the half-elliptic spring.

Q. 33. Do you find in this 14-B-3 truck model before you provision for the longitudinal splaying of the spring links which you say is brought about by the flattening of the half-elliptic and also by the strains of starting?

A. That would be taken care of by the long links which are fast-

ened in the casting at the top of the coiled springs. The coiled springs would give enough to meet that condition.

Q. 34. In starting a car mounted on a 14-B-3 truck like the model, state whether or not the links with their spiral spring supports would take up some of the motion in starting.

438 A. These links would take up some of the motion in starting.

Q. 35. State whether or not these starting strains are duplicated every time the car stops, except that they may be in the reverse direction.

A. Similar strains are thrown upon these links in the reverse direction when the car is stopped.

Q. 36. Will you state whether or not there are strains on the spring support of such a truck in rounding sharp curves and in meeting sudden changes in grades?

A. I should say that there was considerable strain thrown upon the center support of these half-elliptic springs.

Q. 37. And to what point are such strains next transmitted under such circumstances?

A. They would be transmitted to the supports at the ends of the half-elliptics and thus to the links.

Cross-examination.

By Mr. DUELL, without waiver of objections:

X Q. 38. What is the seating capacity of the ordinary 28-foot car body?

A. With a cross seat car of this length, I think the seating capacity runs about 40; with a longitudinal seat car, the capacity will run about 56.

X Q. 39. What is an average load, when the car is what might be termed crowded?

A. I should say about 70 passengers.

X Q. 40. Please look at "Defendant's Exhibit, Model Thyng Truck," and state whether or not, if such were desired, you are competent to provide for additional lengthening or splaying out of the semi-elliptic springs.

(Objected to as new matter and not proper for cross-examination, and as irrelevant and inadmissible.)

A. Upon this model I consider that the links will not provide for the splaying out of the semi-elliptic springs. In order to provide for a condition of this kind, the two links connecting the point of support on the truck frame with the point of support on the half-elliptic springs should be arranged at right angles to their present position, thus allowing them to swing in a direction parallel with the side of the truck frame, or another set of links would have to be added, or something similar, to provide for this motion or splaying of the ends of the half-elliptics.

X Q. 41. Would you have been competent to make this addition or change in the year 1894, or 1895?

(Same objections.)

A. Had I met this problem at that time, I consider that I would have been capable of meeting same.

X Q. 42. Please describe briefly the spring support or system of the Lord Baltimore truck, to which you have referred, which has four wheels of like diameter.

439 A. As near as I can remember it, the half elliptic is suspended at the ends with two flat links, which are fastened to the side of the trucks—side frame of the trucks.

X Q. 43. Please state whether these trucks are pivotal center-bearing trucks; whether a bolster is secured to the semi-elliptic springs; and what the nature of the connections is between the ends of the semi-elliptics and the links, and between the side frames and the links.

A. I am not necessarily familiar with all the details of the construction of this truck, as I have never had any personal experience with using them. My only information has been derived, as stated previously, from a cut of the truck. I do not remember all of the details of the construction.

X Q. 44. What kind of a link suspension have Brill 27-G trucks?

A. The Brill 27-G has a suspension that consisted of a link which was fitted in at its upper end to a ball socket, thus allowing it to radiate in any direction. The upper end of the link being arranged to conform to the shape of the socket.

X Q. 45. How recently have you had knowledge of the Brill 27-G construction?

A. I have been keeping in touch with the general construction of this truck since it was put on the market.

X Q. 46. Do you know that there are also 27-B, 27-C and 27-D Brill trucks?

A. I know that they have the types that you mention.

X Q. 47. Are you sure that the 27-G trucks, or any of them with which you have come in contact, did not have a link suspension, comprising a metal strap encircling the side frame, and not passing up through it?

A. I know that Brill uses that method of suspension upon some of his No. 27 trucks.

X Q. 48. Have you any knowledge of the differentiating characteristics of the 27-B, C, D and G trucks? and if so, what are they?

A. I do not remember all the distinguishing points of the various types as mentioned.

X Q. 49. Do you remember any of them?

A. I know that the truck which they claim as their 27-E-1 truck is a truck used for high speed service with forged steel side frames and with a long wheel base.

X Q. 50. Describe briefly the M. C. B. type of truck.

A. This truck consists of side frames which are made up of heavy bars of steel, supported upon the journal boxes, carrying spiral or helical springs, which in turn support bars which carry the cross bars or transom bars of the truck. The bolster plank is supported by links from these transom bars upon which are carried the coiled springs or elliptic springs according to the type of construction.

X Q. 51. How long have you known of the use of M. C. B. trucks upon electric railways?

A. I have never had any personal experience with these 440 types of trucks, but I know that they have been used for several years upon electric railway service, particularly upon interurban service.

X Q. 52. Can you state approximately the year during which you became aware of such use?

A. I do not remember the date of any particular installation of these trucks in this character of service.

Redirect examination.

By Mr. RAWLE, not waiving objections:

R. D. Q. 53. In what strictly city practice do you know of any M. C. B. trucks?

A. I believe the Brooklyn Rapid Transit is at present installing a number of cars with a type of truck known as the M. C. B. truck which they expect to use in their service through the city and down to Coney Island. I have not seen any of these trucks personally.

R. D. Q. 54. You are in the market for a large number of modern high speed trucks at the present time; state whether or not you would accept a bid for trucks made like the Thyng model which opposing counsel has called your attention to.

(Question objected to as manifestly incompetent, irrelevant and without the issues.)

A. I should not want to consider a truck with a link suspension of that character.

Recross-examination.

By Mr. DUELL:

R. X Q. 55. Do you know who is the manufacturer of the M. C. B. trucks used or to be used by the Brooklyn Rapid Transit Company?

A. I do not know positively who is the manufacturer of this truck.

R. X Q. 56. Do you know other than "positively"?

A. There are a number of manufacturers of this type of truck, and I do not know who they are getting them from.

Adjourned to meet June 20, 1905, at 10 o'clock A. M.

PHILADELPHIA, June 20, 1905.

Met pursuant to adjournment.

Counsel present as before.

Cross-examination of Mr. L. T. PYOTT resumed.

By Mr. DUELL:

X Q. 91. Please look at "Defendant's Exhibit, Model Thyng Patent," and state whether or not, if such were desired, you are

competent to provide for additional lengthening out of the semi-elliptic springs.

441 (The model is objected to, and any reference to it by the witness is objected to, and the question is objected to because the model has not been shown to represent any relevant matter in the case, and because it is not an accurate representation of the Thyng patent.)

(The same objection is made to any reference thereto in the cross-examination of this witness, which objection counsel agree may stand without being repeated after every question.)

A. The distance between the pedestals limits the length of the springs. There is ample room for the expansion of the spring. I feel myself competent; yes.

X Q. 92. Please name one or more mechanical devices to accomplish this end.

(The question is further objected to as irrelevant and inadmissible.)

A. It would be necessary to provide a flexible suspension. Place a stirrup direct from truck frame to end of spring, which would yield in both directions. Provide a bolt with ball-bearing under head, and, if desirous, place an intervening coil spring to obtain this movement.

X Q. 93. Would you have been competent to do this ten years ago?

(Same further objection.)

A. I do not think this would have occurred to my mind, that is, in the form it is shown in the Brill and Peckham trucks. There is a double purpose accomplished by this—to get the combined action of two different classes of springs and also the suspension device combined. It would not have occurred to my mind that way at that time, I don't think.

X Q. 94. Wouldn't you have been competent to provide for an additional lengthening of the elliptic, under compression, by some other device, possibly not including a spiral spring?

(The same further objection, and further, as not proper cross-examination. Complainants' counsel gives notice that he will move to tax the costs of the foregoing and any further like questions on the defendant in any event.)

A. My mechanical knowledge would have prompted me to provide for this action in some manner.

X Q. 95. You could have provided some method based upon your mechanical knowledge then?

(Same objection and notice.)

A. I think my previous answer covers that, if there is a necessity for such a provision.

X Q. 96. Did you build the truck shown in "Complainants' Exhibit, Pyott Photograph No. 1," in strict accordance with the construction shown in "Complainants' Exhibit, Thyng Enlarged Drawing," and to scale?

A. I did.

X Q. 97. About how much set or curvature is shown by the semi-elliptic of Fig. 3 of that drawing?

A. By actual scale, from 3 to  $3\frac{1}{2}$  inches.

442 X Q. 98. By a comparison of Photograph No. 1 and the drawing, can't you see that the set or curvature shown in the photograph is practically twice that shown in the drawing? and if not, how much more?

(Objected to on the ground that the print and photograph do not form the proper basis for a comparison, and because the witness has testified that the actual set of the springs in the physical trucks that he built at the Brill Works was  $3\frac{1}{2}$  inches.)

(Complainants' counsel is reminded that the witness, in answer to question 44, stated that the truck represented by photograph was built in strict accordance with the drawing of the Thyng patent, of which the blue print has been sworn to be a copy.)

A. There is a very slight difference in the conditions. This would be immaterial in the actual construction.

X Q. 99. Then you selected a spring which you considered suitable, although not precisely to the scale of the one shown in the drawing?

A. Yes sir.

X Q. 100. Did you make the shackle connections to scale, or did you use your own judgment as to the length and relation of the parts?

A. The suspensions are in close conformity with the drawing.

X Q. 101. Can't you and won't you answer my question more exactly—which is repeated.

(Objected to as already answered.)

A. The detail sketch which I made is in evidence, and it will show the same.

X Q. 102. I repeat the question once more, and ask you to state either that you made the shackle connection to scale or did not; and used your own judgment as to the length and relation of the parts, or did not?

(The question is objected to as unintelligible, and as having no meaning to which the witness could make an intelligent answer.)

Defendant's counsel feels that he is entitled to a direct and not an evasive or inferential answer to his question, and accordingly deprecates the above objection as bordering upon the frivolous.

A. I was controlled by the drawing, in combination with my own knowledge, which is requisite in working out any mechanical problem.

X Q. 103. Is it necessary, in order not to bend or strain the

shackles of the construction shown in Thyng, to make provision for the free end play or lengthening of the semi-elliptic?

A. To make a successful working truck it would be found necessary.

X Q. 104. Inasmuch as you have testified in answer to cross-question 102 that you were "controlled by the drawing in combination with" your "own knowledge," and testified in the last answer that there is a necessity for such a provision, and testified in answer to cross-question 74 that if the parts of the links were constructed more loosely "it would admit of a freer action," and, in answer to cross-question 62, that, referring to the space along the line of pivot pins, between shackle cheeks or links, "there is apparently a slight clearance there, according to the blue print," why didn't you, 443 in the first place, make the shackle, as shown in the blue print in question ("Complainants' Exhibit, Thyng Enlarged Drawing"); or, in the next place, make other provision for a longitudinal flattening or extension of the semi-elliptic?

A. In the drawing both pins or pivots in the links or cheek plates run in a longitudinal direction, which shows they are only to provide for a transverse movement of the bolster.

X Q. 105. But you said it was necessary, so why didn't you make provision for the longitudinal extension of the elliptics?

(Complainant's counsel objects to the manifest impropriety of confounding questions of fact with those based on mere conjecture.)

A. The necessity of this might occur to my mind in 1901, but don't appear to have entered this invention of 1845.

X Q. 106. You stated that you were "employing your own knowledge," then why didn't you employ it and make the change which you say was necessary as well incidentally as making the shackles more loosely pivoted as shown in the blue print "Complainant's Exhibit, Thyng Enlarged Drawing"?

(Same objection as last, as involving a misstatement of the witness's testimony, and as misstating the disclosure of the drawing referred to.)

Complainant's counsel is referred to the answer to cross-question 102 and to the answer to cross-question 62, which obviously refutes counsel's statements, which, in the absence of a retraction, must appear to be a wilful misstatement of fact.

A. I stated that I was controlled by the drawing, my mechanical knowledge only serving to interpret the same.

X Q. 107. Were you instructed to make the shackles so that they would be rigid under longitudinal pressure by the extension of the semi-elliptics when under depression?

A. I have stated previously that I received no instructions from any parties in connection with building these trucks.

X Q. 108. Then you admit that you did not build the shackles with a clearance along the line of the pivot pins between the sides of the shackle and the links pivoted there between, although "Complainants' Exhibit, Thyng Enlarged Drawing" shows such a clearance,



and although in answer to cross-question 74 you stated that if the parts of the links were constructed more loosely "it would admit of a freer action" (referring to the semi-elliptics); do you admit this?

A. I do not admit this.

X Q. 109. Aren't you rather partisan?

A. There are two links or cheek plates; the yielding action of the spring would have given a sheering process to these plates and be more mechanically defective than when held in close relation. They would tend to sheer off the pin or bolt through the links.

X Q. 110. Couldn't you use stronger pins?

A. Yes.

X Q. 111. How long a semi-elliptic spring is shown in "Complainants' Exhibit, Thyng Enlarged Drawing"?

444 (Question objected to as vague in not specifying whether it is the length of the spring in the drawing or not.)

Defendant's counsel states that he means a spring enlarged to scale, namely, the length in the truck when that also is enlarged to scale to be a full-sized truck.

A. The spring is apparently 39 or 40 inches. This size is used in common practice. In constructing a truck, the longer the spring the greater the advantage in conveying to points of bearing with the axle.

X Q. 112. But you admit in answer to cross-question 98 and cross-question 99 that the spring which you used had a greater set or curvature than that shown in the Thyng enlarged drawing, and was one which you considered suitable, although not precisely to the scale of the one shown in the drawing. Then you admit that you did not select a spring in accordance with the precise scale employed generally in the construction of the truck shown in "Complainants' Exhibit, Pyott Photograph No. 1."

(Question objected to as not properly stating the evidence.)

A. I do not admit that. It is an open question, unsettled as yet, whether the Thyng drawing represents a loaded spring or unloaded. The conditions of Photograph No. 2 would be in exact conformity with spring as shown on print.

X Q. 113. How could the elliptic of the "Thyng Enlarged Drawing" be deemed to be under a load, when the lower part of the bolster is in contact, as you have testified, and no load, moreover, is shown?

A. The trucks as built now at the Brill Car Works show a depression of  $\frac{7}{8}$  inch, the actual set of the spring being  $2\frac{5}{8}$  inches. This bolster would remain close beneath the side frame of the truck until the car or load is placed upon it, then it would yield from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches.

X Q. 114. When you jacked up the ends of the semi-elliptic springs, in order to connect them with shorter shackles, and the spring having the car body thereon, as you have testified, was flattened an inch from the normal, how did you force the shackles outward, the same being "rigid on a longitudinal line," in order to connect them with the ends of the semi-elliptic?



A. Seven-eighths of an inch is what would be the depression of the spring. This would not subject them to any severe strain, as in a surging action under a  $2\frac{1}{4}$ -inch depression and in the act of being propelled by a motor embodied in the truck.

X Q. 115. Please explain "surging action."

A. In entering a curve the swing bolsters are provided in a truck so that the mass or heavy load surges, and it eases the force of the truck against the rail. The motor exerts the same action when the body of the truck starts in which the motor is embodied, the suspended springs are the only devices to bring the secondary action in starting the car. All bolsters are provided with a certain amount of clearance between the truck transoms for freedom of action.

X Q. 116. How much depression from the normal did you say that the semi-elliptic spring was subject to when the empty car body was placed upon the truck?

A. Seven-eighths depression, and five eighths to a half an inch additional with the weight of the body.

X Q. 117. Then, without the body of the car, the semi-elliptic had seven-eighths of an inch depression, the bolster being in contact with the side frames, and with the weight of the body there was an additional five-eighths of an inch, making an inch and a half or three-eighths in all. Do I understand you correctly?

A. Yes.

X Q. 118. And with 80 men upon the car there was a total depression of about 2 inches from the normal; am I correct?

A. About  $2\frac{1}{4}$ , I should state.

X Q. 119. In answer to cross-question 86, you stated that when the spring was raised in the jacking process in order to connect it with shorter links "there is no compression of the spring takes place in this case, the springs, bolster and car body move up together," and yet you admit, in answer to cross-question 117, that without the car body the semi-elliptic had seven-eighths of an inch depression, and with the car body it had an inch and a half or three-eighths depression. How on earth did you force the shackles outward when the spring was already under a depression of an inch and a half or an inch and three-eighths, out of an ultimate depression, when 80 men were on the car of "about 2 inches," as you testified in answer to question 30, or "about  $2\frac{1}{4}$ ," as you testified in answer to cross-question 118? In order to connect the shackles with the ends of the semi-elliptic, although the shackles were "rigid on a longitudinal line"?

A. The question is improper. When the shorter links were applied I have stated that the car body was blocked up and supported on the cross timbers of the truck, it was only necessary to make this seven-eighths depression under the weight of the bolster. I have stated before that they were not subjected to any severe strain with seven-eighths compression.

X Q. 120. But you stated that the semi-elliptic had an inch and half or an inch and three-eighths depression with the empty car body imposed, and that the jacking upward of the end of the semi-elliptic was done with this load. If the shackles hung perpen-

dicularly, as shown in "Complainants' Exhibit, Pyott Photograph No. 1," with no load upon the truck, the long shackles being used, didn't you have to meet a depression of an inch and a half or an inch and three-eighths, and a consequent expansion or extension of the spring in connecting the shackles to the ends thereof?

A. The weight of the car body was not on the bolster, but on the truck frame proper—the bolster was left free, merely its own weight to lift.

X Q. 121. Then, why did you state, in answer to cross-question 86, that "no compression of the springs takes place" in the jacking process, when obviously, as shown in "Complainants' Exhibit, 446 Pyott Photograph No. 1," the bolster is in contact with the side frame, and a depression would have to take place if the links were shortened  $1\frac{3}{4}$  inches. You might also state why a depression of  $1\frac{3}{4}$  inches would not have to be met in changing to the shorter shackles.

(The question is objected to because the witness has testified that the process of changing the shorter links and the jacking up the ends of the elliptics is done under conditions shown in photograph No. 2.)

A. The facts are as stated; the links were shortened  $1\frac{3}{4}$  inches, the springs in entering were depressed seven-eighths of an inch; these facts were obtained by actual measurement.

Recess.

X Q. 122. Please look at "Complainants' Exhibit, Pyott Photograph No. 2," and state how much depression from the normal set is there shown.

A. About an inch and three-quarters.

X Q. 123. You have stated in answer to question 38, that it shows a depression of 2 inches; which of these figures is correct?

A. Wasn't that stated that that was the amount of set with a load? I have made previous statements that the spring compressed  $\frac{7}{8}$ , about  $1\frac{1}{2}$  with the car body on and about  $2\frac{1}{4}$  with a load; to the best of my recollection, this is my evidence.

X Q. 124. You testified in answer to question 30 that with the men on the car the depression of the springs amounted to about 2 inches; in answer to question 32, that photograph No. 2 was taken after the load had been removed from the car body; in answer to question 38, that the photograph "shows the depression of 2 inches"; and now you state a depression as shown is about an inch and three-quarters. These statements appear somewhat contradictory, and although your memory of these tests made about four years ago may be somewhat dim, I want to get at the facts, as near as possible. Please state whether the previous testimony on these points is correct, and whether the depression of the springs, as shown in photograph, was an inch and three-quarters or two inches.

A. Any difference that appears in my statement is merely a fractional matter. Springs manufactured with the same dimensions vary in this amount frequently under the same load.

X Q. 125. Does the semi-elliptic of photograph No. 2 show a permanent set out of the normal by reason of the strain which you have testified that the load including eighty men subjected it to?

A. The spring may be considered a live spring still fit for action and reaction.

X Q. 126. Then why didn't it spring back to a normal set of an inch and three-eighths or one-half, which you have stated it possessed with the car body, but without the men?

A. I have stated, judging from the photograph, that apparently it might be  $1\frac{3}{4}$ .

447 X Q. 127. Then you don't remember just what amount of depression of the elliptic is shown in photograph No. 2, do you?

A. My answer was given judging from the proportions on the photograph.

X Q. 128. Then you don't remember the facts. If you do, please give them.

A. I have answered the question previously.

X Q. 129. Please state whether or not you remember the facts connected with the tests of the Thyng trucks which you constructed.

A. I have a general recollection of all the points.

X Q. 130. Did the elliptic spring of the Thyng truck constructed by you show a depression when the car body was imposed, but after the eighty men had dismounted, of an inch and a half or an inch and three-quarters, or two inches?

A. After the men dismounted the spring reacted to about or near its original condition, say  $1\frac{1}{2}$ .

X Q. 131. When was the strain upon the shackles first perceptibly noticed by you? I mean at what stage of depression of the spring.

A. I noticed it when at the extreme low depression.

X Q. 132. Why was not a photograph taken of the truck constructed by you when the eighty men were on the car body and the spring was at extreme low depression?

A. We simply failed to do that the day I was there and mounted the car. Mr. Philippi, the photographer, came out the next day. I did not think there would be any particular object gained whether the load was on or off.

X Q. 133. You testified in answer to question 38 that Pyott photograph No. 2 shows a depression of two inches, although you now state that it is about an inch and a half and that it "shows a perceptible strain on the spring supports." Please explain how you reconcile this last statement with the fact that the elliptic spring had sprung back to its normal position under the empty car body.

A. As stated before, these varied statements were made judging from the photograph.

X Q. 134. You have stated that the semi-elliptic and the shackles occupy the same position that they occupied before the men mounted upon the car, as is obviously the case, when you say in answer to cross-question 130, that "after the men dismounted the spring reacted to about or near its original condition, say  $1\frac{1}{2}$  inches. Please state where you find upon the photograph No. 2 any indication of

"a perceptible strain on the spring supports," as you stated in answer to question 28.

A. The photograph indicates, and actual measurement is a proof of it.

X Q. 135. Then you had to "perceptibly strain" the links in order to secure them to the semi-elliptic in its original position, didn't you?

A. The weight of the car body and the varying load subjects the links to the strain, and when in action running on the road  
448 the rebounding of the springs bring the straining effect on the suspension device.

X Q. 136. You have stated that you did not test the trucks in action upon the road, didn't you?

A. No sir, there was no continuous rail there to do it on. There were no motors on it to furnish the energy to test it.

X Q. 137. Where did you get the springs which you put into these Thyng trucks?

A. In the storehouse at the Brill Car Company's Works. They were made to order especially for this truck.

X Q. 138. Do you know how long a semi-elliptic spring and one with how many leaves is used by the Brill Company in the trucks of the patents in suit?

A. I never made any special note of this. I never made any special note of the Brill springs, but in practice, having built trucks myself, this is the usual proportion for springs; if the length of springs is great, they increase the number of plates.

X Q. 139. If the semi-elliptics were made specially for these Thyng trucks, as you have testified, why didn't you have them made with a normal curvature more nearly approaching that shown in "Complainants' Exhibit, Thyng Enlarged Drawing," or even flatter, and have the shackles made a little stronger?

A. I have stated before that I was controlled by the drawing in my proportions.

X Q. 140. But you have stated that this was in combination with your own knowledge; and it would seem to have been a simple matter to have made the parts a little stronger, in order to more adequately resist the strain, would it not?

A. I do not think so. If you had increased them they would have been more rigid and subjected to a severer strain and more liable to break.

X Q. 141. Then why didn't you loosen them up a little—I mean the shackles, as shown in the Thyng enlarged drawing?

A. As I have stated before, to loosen them up would subject the pins to a sheering strain. Nothing but a change in construction, and not in proportion, would accomplish the desired effect.

X Q. 142. But certainly stronger pins would have provided more resisting power, would they not, particularly if the eyes of the links pivoted between the shackle sides were somewhat enlarged so as to make a looser connection? Make your answer yes or no, giving your reasons.

A. This did not appear to be anticipated in the patent, or I should have acted in accordance.

X Q. 143. Do you mean to say that the patent did not contemplate the use of parts sufficiently strong for the purpose thereof?

A. The construction, as shown by the patent in the drawings furnished was of ample strength and proportion for cars running a train. Under the conditions of motor-driven cars, which is virtually an electric locomotive placed beneath the car, and subjected  
449 to severe strains in the action of propelling the same, of course, this was not anticipated in the events of years ago.

X Q. 144. How short would it be possible to have a semi-elliptic spring which would be strong enough to sustain the load which it would have to endure, as indicated by the load which you placed upon the Thyng truck, and still retain some spring action?

A. The shorter a spring is the stronger it is, but springs have to assume certain proportions to become active. As I stated before, the longer the spring the better the construction to carry the load nearer the axle bearing. A spring could be put in practice, say 30 inches in length, but this would subject the frame or structural work of the truck to more strain.

X Q. 145. I presume a semi-elliptic 20 inches in length might be used, might it not, although such use might be undesirable?

A. Where the conditions of construction are such that they would have to resort to this short spring, it is common practice to substitute coils. A spring of 20 inches in length never enters into practice.

X Q. 146. It is possible to conceive of such use, however, is it not, where a spiral could not be used and it became necessary to have a slight spring action?

A. Yes, that would be possible; they would be constructed on an equalizing system in practice, where your load does not vary much, as in locomotive construction.

X Q. 147. Might there be some spring action in a semi-elliptic even shorter than 20 inches?

A. There might be a very slight; the spring would merely act as a cushion.

X Q. 148. This would be true, would it not, even though placed in a full-size truck, say in place of the semi-elliptic illustrated in "Defendant's Exhibit, Peckham 14-B-3 Truck"?

(Objection is made to the reference to the model, because it has not been proven in the case.)

A. The elliptical form of spring is preferable under varying loads. As I have testified before, the English trucks use a straighter spring. There is a great saving in using elliptical springs; there is about 20 per cent. of material saved in the manufacture of the same to carry the same load.

X Q. 149. Then, if a semi-elliptic spring, 20 inches long, or even less, were used in a full-sized truck of the type illustrated by "Defendant's Exhibit, Peckham 14-B-3 Truck," in place of the semi-elliptic there shown, there would be a slight spring action, would there not, according to the way the spring is built?

(Same objection, and further that the question is hypothetical and irrelevant.)

A. There would be a slight springing action. In combination with the springs, as shown on the model referred to, there would be a varied action, according to the load carried.

150 X Q. 150. In the average truck, how many plates would you put into a semi-elliptic spring?

A. About six plates. Sometimes the width of space is limited, and narrow and more plates could be added.

X Q. 151. In a car with a seating capacity of 36 to 40, isn't a load of 80 people rather heavy?

A. I have seen cars with a seating capacity of 22 persons with 110 persons in.

X Q. 152. What kind of truck or trucks were under this car?

A. They were four-wheel cars of the old type.

X Q. 153. Do you consider that the shackles used in the Thyng trucks, constructed by you, were too rigid to admit of proper longitudinal play of the elliptics?

A. In practice it would have subjected them to severe strain.

X Q. 154. In your report with reference to the tests made by you of the Thyng truck, you state "in other words, to make a thoroughly practical support it (referring to the bolster) should be universal moving transversely and longitudinally in relation to the car, either pivoted in each direction or supported on a ball or radial-seated bearing." Do you mean by that that you would pivot it in two directions instead of one?

A. Yes.

X Q. 155. Would you consider that supporting it on a ball or radial-seated bearing would be a practical means of remedying the defect which you have mentioned?

A. I would consider that the preferable method.

X Q. 156. Would you consider the two methods which you have mentioned the obvious means to remedying these defects?

A. They would both answer the purpose. The ball-bearing, in my estimation, is preferable, because it can be renewed.

X Q. 157. Do you consider yourself competent to make this change?

A. This might not have occurred to my mind originally, but I consider myself competent to give an opinion on the subject, and put it in proper proportions and shape adapted to the work to be performed.

X Q. 158. You stated in the North Jersey case that pivoting in two directions or providing a ball or radial-seated bearing, indicated in your report, would be obvious means of remedying these defects. Do you still agree with this testimony?

(Objected to unless the North Jersey record is offered in evidence.)

A. I do.

X Q. 159. As a practical mechanic, could you have made these changes ten years ago?

(Objected to as irrelevant and inadmissible.)

A. I cannot say that I would have followed this line of construction had it not been brought to my notice; about that time I had pat-

ented and constructed trucks, and this method had not entered into my construction.

X Q. 160. Wouldn't you have been competent to make the changes indicated, or equivalent changes, had you considered that a  
451 necessity existed for these two motions of the bolster; that is, longitudinal and lateral?

(Same objections.)

A. I think it would have occurred to my mind.

X Q. 161. In the Thyng trucks which you constructed, what proportion of the total load was borne by each individual semi-elliptic?

A. Each of the elliptics carries one-fourth of the load and each suspension one-eighth of the load, I cannot say exactly what the amount was.

X Q. 162. If you want spring action in any part of the truck, how do you get it?

(Objected to as irrelevant to the issue.)

A. It is preferable to have spring action immediately over each journal. In constructing six-wheel trucks, an even proportion of the weight is brought to bear on each journal by a system of levers or beams called equalizers.

X Q. 163. Could a spring carry with perfect safety, even though compressed to a straight line?

(Same objections.)

A. This frequently occurs with no serious results.

X Q. 164. The only difference between the use of a rigid equalizing bar in place of the semi-elliptic, as shown in the Thyng truck, would be the expected loss of elasticity, would it not?

A. That is all.

X Q. 165. Then, when you wish spring action, you would put in a spring, either in addition to the equalizing bar or in place of it, would you not, in order to get such spring action?

(Same objection.)

A. Springs could be placed in combination with the bar or intervene between the sections of the bolster; that is, the latter is steam railroad practice.

X Q. 166. And I presume that you could substitute the bar for the semi-elliptic, or vice versa, could you not, in the Thyng truck, or one generally similar to it?

(Same objection.)

A. A beam could be substituted, or a spring. The use of either transfers the weight near to the journal boxes.

X Q. 167. Is the Thyng truck adapted for use on steam railways where the speed is from 12 to 20 miles an hour?

(Objected to, because the period of use, whether 1845 or 1905, or when, is not specified, the conditions changing enormously between those dates.)

A. I consider it a practical truck in train service, at the time of its invention, but not when you convert it into an electric locomotive of the present date.

X Q. 168. Is it the weight, exertion and force to which the truck would be subjected in present practice which is the consideration requiring a change, as you state, in the details of construction?

452 (Same objection.)

A. The strain is brought to bear in the exertion of 60 to 100 horse power for the propulsion of the car. That is the consideration.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 169. How about the difference in propulsion as between steam and electric practice?

A. In steam, railway trains are pulled or trail after the locomotive, the trucks merely performing the duty of supporting the weight. In electric practice, the conditions are entirely different; the truck, with the motors applied, becomes what might be termed a sub-motor. They propel the car, and are required to be built stronger in proportion to stand the exertion and strain brought to bear by the motive power.

The report of the witness, being the letter of the witness to Mr. Levy, of June 19, 1901, offered in evidence during the examination of the witness after the answer of the witness to question 41, is here spread upon the record, defendant's counsel insisting upon the objections previously made by him thereto.

(Counsel for defendant further objects, in view of the objections by complainants' counsel to all reference to the North Jersey record, on the ground that the report of the witness has been copied therefrom and is, accordingly, incompetent, unaccompanied by the offer in evidence of the said record.)

Complainants' counsel states that the insertion of the exhibit in the record at this point is a mere matter of convenience. Also, that the offer of the letter by means of a copy thereof, testified by the witness to be a true copy, was made only after proof by the witness that the original was lost, and that at the time of offering the copy the defendant's counsel stated on the record: "No objection is made by the reason of the fact that it is a mere copy and not the original."

PHILADELPHIA, PA., June 19, 1901.

Mr. Jos. L. Levy, 206 Broadway, New York City.

DEAR SIR: In re L. B. Thyng Patent No. 4276, of November 18, 1845.

The general object of the invention as described and shown in drawing is to provide a flexible or yielding bolster to equalize or distribute the weight of car on the center pivot and side bearings of the truck. The truck bolster or swing beam, being of such length and method of construction as to carry the load suspended on the side frame of the truck with side-supporting springs of half-elliptic



style provided with suspension links pivoted at the upper and lower ends, to admit of bolster in unison with car body swinging  
 453 transversely in relation to the main structure of the truck, the truck springs to admit if action requires to lengthen. As shown in the patent this does not seem to be provided for. In other words to make a thoroughly practical support, it should be universal moving transversely and longitudinal in relation to the car, either pivoted in each direction or supported on a ball or radial-seated bearing. By actual test of trucks constructed as described from copy of drawings furnished from the Patent Office, these facts came to notice: A car body weighing 14,000 pounds, loaded with eighty passengers weighing about 12,000 pounds, making a total of 26,000 pounds, supported on four springs 39 inches length of centers, plates six in number  $\frac{3}{8}$  by 4 inches, sections with  $3\frac{1}{2}$  inches of set, when in action under the strain of this load supporting 6,500 pounds on each individual spring, they settled to almost a straight line in form, changing the centers of length of springs from 39 inches to  $40\frac{1}{2}$  inches, showing the necessity of the universal or double action in the supporting springs which had not been anticipated or provided for in this patent.

Yours truly,

LOUIS T. PYOTT.

Adjourned to meet Wednesday, June 21, 1905, at 10.15 A. M.

POST OFFICE BUILDING,

PHILADELPHIA, June 21, 1905.

Met pursuant to adjournment.

Counsel present as before.

*Redirect Examination of L. T. Pyott Continued.*

By Mr. RAWLE:

Counsel agree that the "Defendant's Exhibit, Thyng 1845 Patent" is an uncertified Patent Office copy of the patent to L. B. Thyng, No. 4276, the drawing of which is identical with the drawing constituting "Complainants' Exhibit, Thyng Patent Drawing."

R. D. Q. 170. I understand that in building the Thyng trucks you used the drawings of the Thyng patent, which I hand you, and which is marked "Complainants' Exhibit, Thyng Patent Drawing."

A. Yes, I did.

R. D. Q. 171. In building those trucks from the drawing, to which you have just referred, did you also use the specifications of the Thyng patent which I hand you, and which is marked "Complainants' Exhibit, Certified Copy Thyng Patent"?

A. Yes, I did.

R. D. Q. 172. Also the blue print marked "Enlarged Drawing"?

454 A. I used a copy of the patent, specifications and blue print marked "Thyng Enlarged Drawing."

R. D. Q. 173. In doing the work, which controlled you?

A. The information given by that specification, and the enlarged print. The enlarged print was placed in the hands of the workmen who performed the actual labor on the truck.

R. D. Q. 174. Please look at the drawing of the Thyng patent, "Complainants' Exhibit, Thyng Patent Drawing," and state whether or not it shows any space or clearance between the side plates of the shackles and the upper bolt and lower clevis connected therewith.

(Objected to as having been already answered in the negative, which answer constituting as it does, the inability of the witness to discern the obvious, will be commented upon at the proper place and time.)

A. The copy of patent and enlarged drawing conform, in one link on the Patent Office drawing there is just a slight space there, that is perceptible to the eye.

R. D. Q. 175. State whether or not, in your opinion, as a mechanic, and as an experienced truck constructor, the construction of that Thyng truck with looseness of the parts between the side plates of the shackles and the upper bolt and the lower clevis, would be good mechanical construction.

(Objected to as indefinite in the use of the word "good" and as incompetent.)

A. I don't think it is intended by the inventor or as shown in drawings that there should be any slackness of parts.

R. D. Q. 176. Assume that a Thyng truck were built with looseness of parts in the shackles, in a longitudinal direction, what would be the effect of this construction if the truck were put in service and operated? I mean what would be the effect on the shackle plates and parts.

(Objected to as hypothetical, speculative, incompetent and irrelevant, and as containing an unwarranted assumption.)

A. The links, being double, chafe vertically on the pins to exert a sheering strain, as I have said before.

R. D. Q. 177. Would this sheering strain be increased or diminished by an increased looseness of parts in a longitudinal direction; that is, would it be greater or less, according as you increased this looseness of parts?

(Same objection, with the exception of the assumption mentioned above.)

A. The action of the springs under varying loads would increase or diminish; the spring, in fact, controls this; that causes a greater or less action and produces the sheering; if you move them a quarter of an inch apart, it would be greater; if you put them in closer proximity, it would be less.

R. D. Q. 178. If you should attempt to provide looseness of parts by increasing the size of the pinholes, state whether or not this would constitute a good mechanical construction, giving your reasons for your opinion.

455 (Same objection, and as indefinite in not stating what pin-holes and in the use of the word "good.")

A. It would not; this is not regular practice.

R. D. Q. 179. If the truck were so built and operated, what would happen to the shackle parts?

(The same objection, less indefiniteness.)

A. And as I have stated before, it would subject it to undue wear and sheer, and only forming a receptacle for dirt, and wear it out rapidly.

R. D. Q. 180. Can you explain a little more fully to the court just how this wear and sheering strain would come on the shackles and bolts under such circumstances?

A. My three previous answers, I think, cover the whole subject.

R. D. Q. 181. With the bolts working in loose bolt holes, what rubbing of parts would take place on the shackle plates and the bolt and the clevis when the truck is being operated; that is, how would these parts rub together and with what effect on them?

A. As previously stated, they would form a receptacle for dirt if a side slackness was allowed or a diametrical loose fit on the pivots, this would tend to increase the wearing of parts.

R. D. Q. 182. In answer to cross-question 166, you stated, with reference to the Thyng truck, that "a beam could be substituted or a spring"; state whether or not, if a beam were substituted for a spring, it would be a good mechanical substitute for the spring in that truck.

A. It would not. The spring has this advantage; it yields under the load; a beam placed under the bolster as a support would enter into the construction merely to convey weight to the points of suspension near the journal box, while the spring answers a double purpose, reaching to these points and also being elastic.

R. D. Q. 183. What part of the shackles of the Thyng truck have you designated as the "link"?

A. Check plates; I call them cheek plates or links. I mean the part connecting the clevis with the upper bolt.

R. D. Q. 184. State whether or not the car sills of those Thyng trucks and cars at the Brill Works came down low enough to strike the truck before you put the eighty men on the car.

(Objected to as incompetent, irrelevant and without the issues formed by the claims relied upon of the letters patent here in suit, particularly so in view of the obvious immateriality of the construction of the Brill cars.)

A. I have previously stated this and explained it. They did.

Re-cross-examination:

By Mr. DUELL:

R. X Q. 185. In answer to question 12, you stated that "Complainants' Exhibit, Thyng Enlarged Drawing" (blue print) was the identical print from which you worked; this was correct?

A. To the best of — knowledge that is the same drawing.  
456 R. X Q. 186. And in answer to cross-question 102 and cross-question 106 you stated, "I was controlled by the drawing" (referring to the exhibit above mentioned and relative to the Thyng truck which you constructed). This also, I presume, is correct?

A. Yes.

R. X Q. 187. When the empty car body was imposed upon the Thyng truck constructed by you, as shown in "Complainants' Exhibit, Pyott Photograph No. 2," what was the distance between the bolster and the lower side of the side frame?

A. As stated before, it would be about a half an inch, from the fact that the spring was compressed seven-eighths of an inch on entering, the car body depressed it from one-half to five-eighths additional as before stated.

R. X Q. 188. When you fastened the ends of the semi-elliptic to the shorter shackle, which you put into the Thyng construction, did you place the parts to be connected in position by hand, or otherwise?

A. I have stated we used the jack to compress the spring slightly.

R. X Q. 189. Did you put the shackles in position for joining by hand? that is what I meant.

A. Yes, sir.

Deposition closed.

LOUIS T. PYOTT.

Sworn to and subscribed before me this twenty-first day of June, 1905.

SAMUEL BELL, *Examiner.*

Signatures of all witnesses waived, subject to reasonable demand therefor.

WALTER E. HARRINGTON, a witness called on behalf of the complainants, having been first duly sworn according to law, testified as follows:

By Mr. RAWLE:

Q. 1. State your name, age, residence and occupation.

A. Walter E. Harrington; age, 39; residence, Beverley, N. J., and am vice-president and general manager of the New York-Philadelphia Company.

Q. 2. State what was your education and what has been your successive occupations in business.

A. I graduated from the University of Pennsylvania Department of Mechanical Engineering in 1887. I was employed as a draftsman by the Magnesia Sectional Covering Company for one year. I was then engaged in general contracting until 1889. From 1889 to 1891 I was employed by the Pennsylvania Railroad Company in charge of the electric railways at Atlantic City, N. J. Until  
457 the spring of 1892 I was engaged by the Wheeling Traction Company as superintendent. From the spring of 1892 until  
19—66

the winter of 1893 I was in general engineering work installing electric railways at Shenandoah, Pa., and Carbondale, and with the General Electric Company in expert engineering work.

In the winter of 1893 until June, 1896, I was employed as electrical engineer by the Camden Horse Railway Company, of Camden, N. J., having charge of the car shops, overhead line work and power stations. From June, 1896, until May, 1904, I was general manager of the Camden and Suburban Railways, which leased the Camden Horse Railway Company. In May, 1904, that company was merged into the Public Service Corporation of New Jersey, and I became general superintendent of the South Jersey Division of this system, covering the same mileage with some additional territory. I held that position until March, 1905, since when I have been connected with the present company, which is a company operating an electric railway between Camden and New York, owning the trackage between Riverton, N. J., and New Brunswick, N. J.

My first experience with trolley roads was in 1889 with the Pennsylvania Railroad Company at Atlantic City.

Q. 3. State approximately the mileage and equipment of the system of roads in and about Camden, N. J., on which you were employed from the winter of 1893.

A. When I took the position with the Camden Horse Railway Company they had already electrified what was known as their Market Street line to Merchantville; the distance was four and three-quarter miles, approximately, single-truck cars, 18-foot bodies. The road was gradually developed so that the entire system was changed over electrically, abandoning horses on or about the year 1894 or 1895. Until 1898 all equipments purchased were of the single-truck pattern, using the Brill type single truck known as 21-A, 21-B, 21-C, and of later years, where single trucks were purchased, 21-E. About 1895 several Peckham single trucks were purchased, having 30-inch wheels and truck frame riveted.

In 1898, we obtained one pair of Maximum traction trucks and placed same under Car No. 80. This was followed by the purchase of St. Louis Maximum traction trucks, followed by the purchase of 27-G Brill trucks—seven equipments. In 1900, five equipments of 14-B-3 Peckham trucks.

All of these double trucks have been operated by us continuously since then, except the old set of Brill Maximum traction trucks, built in 1894, which we abandoned owing to the small size of the car and certain structural difficulties in it.

Q. 4. State whether or not, in your connection with this electric system in and about Camden, your duties have been practical, and especially with regard to trucks.

A. They have been. All the operating details were looked after by myself.

Q. 5. What have you had to do with the purchase of trucks and with the deciding what trucks and what make of trucks to buy?

458 A. It has been my province to prepare the specifications, make the recommendations for the purchases of the various

equipments, and in all cases the equipments purchased were the equipments recommended by myself.

Q. 6. What type of trucks were used on the Atlantic City line while you were with them?

A. As I recall it, it was the No. 7 Brill. This was a single truck, all spiral springs.

Q. 7. What did they use on the Shenandoah and Carbondale lines?

A. The 21 type; I think, A. This was a Brill single truck with combined spiral and elliptic springs.

Q. 8. In deciding what new equipment to buy while you were with the Camden system, were you familiar with the various types of four and eight-wheel trucks made by the truck makers of the United States? and, if so, please name them.

A. I was; about 1897 the double-truck practice came in general use. The truck makers, as I recall them, were as follows: J. G. Brill Company, the Peckham Manufacturing Company, Taylor of Troy, N. Y., Bemis of Springfield, Mass., Maguire of Chicago, the St. Louis Car Co., St. Louis, Barney & Smith of Dayton, Ohio, the Laconia Company of Laconia, N. H., and the Baltimore Car Wheel Company of Baltimore, Md.

Q. 9. When did you first become familiar with the Brill 27-G truck?

A. That was about 1897.

Q. 10. At that time were you familiar with the truck construction used on steam cars?

A. I was.

Q. 11. As a practical truck man, what light did the steam railroad truck practice throw upon the electric street railway truck practice?

A. The Master Car Builders' truck as employed by the steam railroads was not adapted to the requirements of trolley equipment, in that the method of construction raised the car too high from the street, the wheel base of the truck was too long, the motors were not required in the Master Car Builders' truck, and there was no provision for mounting the motors.

Q. 12. State what were the advantages of double-truck cars as compared with single-truck cars.

A. A double-truck car makes easier riding, in that it prevents oscillation, which is present to such a great degree in single trucks. The use of longer car bodies is — permissible than in single trucks; higher speeds may be maintained; the wear and tear on the track is materially reduced; the amount of power required to propel a double-truck car, per passenger, is less; the cost of operation of a double-truck car for carrying capacity is less in what is known as platform expenses. There is less pounding on the track due to the use of eight wheels instead of four.

Q. 13. At this point I will ask you to state what types of truck you are using on your present road; what length and passenger capacity of cars, and what capacity and top speed you run at.

459 (The question is objected to as indefinite in the use of the term "types.")

A. We have the 27-G Brill truck and St. Louis double trucks. The cars that are mounted on the two above-mentioned trucks are 32 feet long in the body over corner posts, and are 43 feet over all. The seating capacity is 48; the extreme carrying capacity from 75 to 100.

The cars will make speed of from 25 to 35 miles an hour, with occasional spurts of from 40 to 50 miles an hour, with a schedule speed, including stops, averaging 14 miles an hour on one division, and on another division averaging 24 miles an hour.

Q. 14. That was a digression. I will now ask you to return to the Master Car Builders' type of truck and the first introduction of the Maximum traction type of truck when pivotal truck cars came into use; what have you to say about Maximum traction trucks and their advantages?

A. The early development of railway rolling stock was along the lines of longer cars, and the invention of the Maximum traction truck, so-called, was the result of this demand, brought about by the two controlling factors; first, you get a truck that would radiate under bodies and that would admit of use of one motor only. The Maximum traction equipments in the early days were confined almost exclusively to relatively slow speed equipment.

The necessities dictated having the car body as close to the ground as possible, in order to avoid the high step from the ground to the platform of the car, and also to provide that the car would go under bridges and the usual overhead construction usually present in cities and towns.

The Maximum traction truck has two axles, one axle having wheels from 30 to 33 inches in diameter, the other axle having wheels from 18 to 24 inches in diameter, according to the make. The pivotal point of the truck is located at a point on the center lines between the axles, normal to the axles, from 3 to 4 inches immediately over the center of the large diameter wheel axle. The idea of this is to have the maximum traction on the large wheels and also to permit the small wheels to radiate underneath the car body to avoid interference with the under construction of the car in round curves.

Q. 15. State any new requirements of the business which came into the business after the adoption of the Maximum traction truck.

A. The Maximum traction truck was found to be quite destructive to track. The development of trolley roads into suburban districts brought about the requirements of still higher speed, increased power, which was not found in the Maximum traction truck, being limited to use of two motors per car, and it was found that the truck was not safe to run on the high speeds required, in view of the frequent derailments of the Maximum traction truck under these higher speeds, due to the smaller wheels and small tractive qualities.

Q. 16. What was the net traction of the Maximum traction type?

A. The tractive effort on the Maximum traction truck varied from 65 to 85 per cent. of the total traction.

460 Q. 17. What new and beneficial features did you find in the Brill 27-G, which you first began to use in 1899, and the



Peckham 14-B-3 in 1900, as compared with the Maximum traction type and the new requirements of the business?

(Objected to as irrelevant, leading and as containing an assumption in the use of the word "new.")

A. The 27-G Brill and 14-B-3 Peckham trucks filled the requirements in that they permitted the truck to radiate under the car body having a 4-foot 6-inch wheel base, with the motors hung out and away from the axles, and away from the center of the truck; that is, the motors were not mounted between the bolster and the axle.

Four motors were permitted, thus giving the added power required to propel the cars at the higher speed and longer runs for the suburban business. The trucks also, by reason of being pivoted centrally, resulted in the car riding more smoothly and using all the traction available—using the entire 100 per cent.

Q. 18. How are the 27-G Brill and 14-B-3 Peckham trucks as to easy-riding qualities?

A. There is very little difference in the riding qualities of these two trucks. If anything, the Peckham was the easier-riding truck in that the more crosswise motion was permissible in the Peckham 14-B-3 truck. In comparison with the St. Louis center pivotal double truck the difference in operation is very little.

Q. 19. Compare the Brill and Peckham trucks mentioned with the Maximum traction with respect to easy riding.

(Objected to as being wholly irrelevant.)

A. The center pivotal trucks in all instances were markedly easier in riding compared to the Maximum traction truck.

The adoption of the center pivotal truck as represented in the 27-G Brill and 14-B-3 Peckham marked a very substantial and necessary development in the use of railway trucks for trolley purposes.

Q. 20. In considering the comparative ease of riding between the old Maximum traction and its successor, the truck here in controversy, what part did the difference in spring arrangement between the two types play?

(The use of the word "types" is objected to as indefinite and misleading.)

A. The Maximum traction truck depended for its spring action upon the axle having the small diameter wheels upon a spring set in the pedestal box, the pivotal point being so near and adjacent to the tractive axles that the spring action was very unsatisfactory, resulting in throwing various irregularities in track and the motions resulting therefrom into the car body.

The center pivotal truck, having the bolsters supported on elliptical springs, the ends of which were hung in series through spiral springs, absorbed the motions caused by the irregularities in track to such an extent as to make a marked difference in the riding of the car.

461 Q. 21. Can you state whether or not there is a difference of rhythm and of action in the elliptic and spiral springs in the type of truck in suit?



(Same objection to the use of the word "type.")

A. It is a well-known mechanical fact that a spiral spring is more active for a given size and capacity than an elliptic form of construction of spring. Furthermore, the smaller a spiral spring is the greater its responsiveness. In order to illustrate, taking a given sized spiral spring and comparing its activity or responsiveness to two springs (spiral) whose combined capacity is equal to the latter, the two springs will be more active and responsive than the larger spiral spring of equal capacity.

The combination of the relatively like spiral springs at the end of the elliptic springs results in reducing the jars and variable motions, due to the difference in rhythm between the two springs.

The Maximum traction truck has only spiral springs.

Q. 22. State what advantage you find, if any, in the location of the spiral springs between the ends of the semi-elliptic springs on the truck frame.

A. As stated in my previous answer, the spiral springs are more responsive and quicker in action than the elliptic, and by placing the spiral spring at the ends of the elliptic where the *moment* is such that the force element is less than at the center of the elliptic spring the spring may then be of lighter construction, followed by greater responsiveness, thus reducing to a minimum the transmission of the various movements due to the irregularity of the motion of the truck over the track, to the car body.

Q. 23. State whether or not this ease in riding would be obtained by placing spiral springs between the truck frame and the bolster; that is, either spiral or other springs.

A. It will not.

Q. 24. Please explain why not.

A. The spiral springs in the bolster being directly underneath the car would of necessity be a heavier spring and would not permit of the same responsiveness as in the side springs as would be permitted at the end of the elliptic. The chief reason, however, against placing the spring in the bolster is that the difference in rhythm between the spiral and the elliptic spring, which is quite necessary to neutralize the multitudinous and continually varying motions, is not obtained.

Springs were not permissible in the bolster for the structural reason that by such method of construction the car body would be raised to such a height as not to be permissible.

Q. 25. Please assume a truck with half-elliptic springs on the side, but no spirals at the ends of the half-elliptic springs, or any other kind of springs than spirals, would such a construction produce this ease of riding if spirals were inserted over the axle boxes of such a truck?

(Objected to as incompetent, hypothetical and irrelevant; and as improper, it obviously appearing that reference is being made to a truck illustrated by "Defendant's Exhibit, Model Thyng Truck," which is now present.)

A. It would not.

Q. 26. Have you had any practical experience of a truck run under those conditions?

A. I have had both the 27-G and 14-B-3 trucks that had been operated with the spiral springs broken connected at the end of the elliptic spring, as well as trucks operating with the spiral spring at the end of the elliptic spring in intact condition with the spring broken over the pedestal box, with noticeable difference in the easy-riding character of the truck.

Q. 27. State whether or not, in your opinion, the use of half-elliptic springs alone would make an easy-riding truck.

A. No. Depending upon the half-elliptic spring alone would result in rough riding, as the difference between the truck riding with or without the spiral spring at the end of the half-elliptic is noticeable, as explained above. The same objection would apply to the spiral spring out over the pedestal box. The chief advantage in the use of the spiral springs with the elliptic spring is in the neutralizing of the continually varying motions due to the difference in rhythm between the different types of springs.

Q. 28. Please examine the construction of the truck as represented in "Complainants' Exhibits, Photographs of Thyng Truck Nos. 1 and 2," and state whether you understand the construction there shown.

A. I do.

Q. 29. Please state whether or not, in your opinion, trucks of this form of construction would give an easy-riding car.

(Objected to as wholly irrelevant to any issue in this case.)

A. It would not. The only spring evident in the truck is half-elliptic, immediately under the bolster, which is rigidly supported at each end of the elliptic spring by bolted flat hangers. The ends of the elliptic spring, by reason of its rigid attachment to the flat hangers, does not permit of longitudinal displacement bound to ensue from any change in the half-elliptic following changes in loaded cars. It would appear from the photograph that the forces set up by the motion of the elliptic spring would result in the early destruction of the bolted strap suspension.

Q. 30. If a motor were placed on the truck of these photographs to propel them in operation in the car body placed thereon, where would the initial strain, when starting and operating the motor, come? Assume that the motor is mounted according to the usual trolley practice.

(Objected to as indefinite, irrelevant and hypothetical.)

A. Motors mounted upon the axles, the first effect of the power applied by the motor would be the pressure of the pedestal boxes against the pedestal, thence transmitted through the main  
463 frame of the truck to the bolted rigid strap hangers, thence through the elliptic spring to the bolster.

Q. 31. How are these strains provided for, if at all, in the 27-G and 14-B-3 Peckham type of trucks?

A. In both instances the bolt or strap through which the spiral

spring is connected to the half-elliptic is mounted in such a manner to permit of free lateral movement for stresses of this character, and a longitudinal movement in particular.

Q. 32. By what method of propulsion was the truck of these Thyng photographs Nos. 1 and 2 intended to be drawn: by a locomotive as steam cars are, or to be propelled by an electric motor as trolley cars are?

A. I would take it that the construction is for propulsion from outside sources, such as locomotives or horse power, and then at very slow speed.

Q. 33. In your opinion, would you consider that the truck shown in these photographs is a sufficiently practical truck for use in electric traction, as practiced today, with large cars and heavy loads, and high speed, etc., as you have described?

(Objected to as irrelevant to any issue in this case.)

A. No.

Q. 34. If the truck of the photograph were motor-driven, state whether or not, in your opinion, its semi-elliptic springs would be involved in the operation of propelling the car body through motion first imparted to the truck.

A. They would. The rigidity of the bolted strap supports and the connecting of the end of the half-elliptic to the supports would result in all stresses developed by any change in the motion of the truck, either forward or backward, being transmitted through the half-elliptic during the time that the bolster is shifting or changing its position as to the transom across the truck, in which the bolster is located.

Q. 35. State whether or not this would likewise involve the links or shackles which support the half-elliptic springs.

A. It would, by reason of the rigid connection thereto.

Q. 36. You have stated the strenuous and exacting practice on your roads with long and heavy car and heavy loads and high speeds, up to 40 or 50 miles an hour; please state, whether, in your opinion, this business could be done with the use of any truck known to the trade or to you prior to the introduction of the type of truck here in controversy.

(Objected to as wholly irrelevant to the issues formed by the claims relied upon of the letters patents here in suit; as hypothetical and as indefinite and misleading in the use of the word "type.")

A. It could not.

Q. 37. When did the development of this strenuous and exacting practice in trolley roads first begin?

A. In about 1898, and with the adoption of the trucks 27-G and 14-B-3 type began a development in street railway practice resulting in the investment of millions of dollars which is  
464 attributed to no other reason than the opportunity offered by the use of trucks of the above-mentioned description.

(The answer is objected to as volunteered and wholly relative in its scope and character.)

Q. 38. Can you give any approximate idea of the extent of the development by mileage or by dollars of this business that you have just referred to?

(Objected to as incompetent and irrelevant.)

A. To answer this question specifically in numbers of cars or actual amount of money involved it is not possible at this time. I make the statement based upon general observation. I am an active member of the American Street Railway Association, with no other object in view than to keep in touch with the practice in the development of railway apparatus and appliances, and have to say that the most noticeable thing has been the development above referred to.

Q. 39. Starting with the truck shown in the two Pyott Photographs Nos. 1 and 2, state whether it would have occurred to you in 1895, to devise therefrom a truck of the construction of 27-G Brill 1 or 14-B-3 Peckham.

(The question in the form asked is objected to as incompetent, irrelevant and misleading; and further, as indefinite in lack of specifications.)

A. Having invented quite a few devices, I can appreciate that the logical processes through which the form of truck, as shown on the photograph and that shown in the form as represented in the 27-G or 14-B-3, would be a natural result.

Question reread to the witness:

WITNESS: You see I haven't exactly answered that question. As the 27-G and 14-B-3 trucks are such a marked departure from the practice, as would be indicated from the form of truck as indicated on the photograph, the result would indicate that a pure invention is involved.

I would say that that is an invention, and it would appear to me as logical to arrive at the result as shown in the 27-G and 14-B-3 truck.

(The reference in the foregoing answer to "invention" is objected to as usurping the functions of the court, and accordingly is incompetent, particularly in view of the fact that the Circuit Court of Appeals for the Third Circuit has decreed with reference to the claims here relied upon, among others, that in point of fact no invention did or does not exist, and notice of motion is given to strike the same from the record.)

Q. 40. My question (question 38) was a little different from that. It was as to whether it would have occurred to you, say in the year 1895, if you had seen the truck of the Pyott photographs, to have devised trucks of the said Peckham and Brill type?

(Same objection as to question 38, and further, as being unwarrantedly hypothetical and as indefinite in the use of the word "type.")

A. As stated above, I believe that if I had been working in the

development of a truck, and knowing the requirements as they then existed, that it would have occurred to me, after having analyzed the details of construction as illustrated in the Thyng truck, 465 that the form of truck as shown in the 27-G or 14-B-3 would have been the invention resulting therefrom.

(The same objection and notice as to the answer to question 38, in reference to the term "invention.")

Q. 41. What is your opinion as to the cost of maintenance of 27-G Brill and 14-B-3, as compared with other forms of trucks with which you have had experience, including Maximum traction?

A. The difference in cost of repairs as between the 27-G Brill and the 14-B-3 Peckham is negligible; compared to the Maximum traction trucks the cost of repairs is from 25 to 35 per cent, more than either of the two latter. As to other forms of center pivotal trucks, corresponding to the 27-G or 14-B-3, my judgment is that either the Brill or the Peckham truck is less than any other type, approximately from 10 to 15 per cent.

Cross-examination of Mr. HARRINGTON.

By Mr. DUELL, without waiver or objections:

X Q. 42. Please look at "Complainants' Exhibit, Pyott Photograph No. 1," and state whether or not, if the problem had presented itself ten years ago, you consider that you would have been competent to provide practical mechanical means for allowing an unrestricted extension of the semi-elliptics and consequent outward splay of the spring supports or shackles, if such longitudinal play had seemed to you desirable.

(Objected to as irrelevant.)

A. Yes.

X Q. 43. If you had considered that the supports or shackles connected to the ends of the semi-elliptics required cushioning, in order to provide a better or more desirable spring support, and you had had before you at this time, either the Peckham 14-B-3 links or the Brill 27-G links, or the links illustrated by "Defendant's Exhibit, Overbagh Spring Hanger," would you consider that you would have been competent as a practical mechanic to substitute any of these latter hangers for those shown in the photograph referred to?

(Objected to as irrelevant; also because the Overbagh spring hanger has not been proven to represent anything in the case.)

A. I do.

X Q. 44. Do you consider that this Pyott photograph No. 1 obviously indicates the defects which you have mentioned, namely, a lack of suitable provision for longitudinal play of the spring and shackles, and possibly, in order to make an entirely desirable spring system, a lack of cushioning means or spirals, combined with the spring supports or shackles there shown?

A. In answer to the first question here involved, I would state that it would appeal to anyone of a mechanical turn of mind and



one accustomed to drafting, quite clearly, a lack of suitable provision for longitudinal play of the spring and shackles.

466 In answer to the second question involved, it would be a difficult thing to state how far one, who had a very little experience in the practical qualities of various types of springs, would approach this problem. I happened to be working from 1893 to 1895 in inventing a line of apparatus wherein a thorough investigation was made where the qualities of both spiral and elliptic springs were involved. For this reason, I would assume that it would have been a logical sequence from the personal knowledge I had to have contemplated this feature of construction. I do not wish to be misconstrued, but wish to clearly express the idea that the elements involved in the 27-G and 14-B-3 truck are radically different from that shown in the photograph referred to, and clearly comes under what I would state to be pure invention.

X Q. 45. Do you consider that if you had directed a skilled mechanic, skilled in the art of truck building at the time afore-mentioned, to obviate these defects above noted, and had shown him all or any of the three previously mentioned hangers, he could have made the substitution of one for the other—I mean for the Thyng hangers?

(Objected to for the above reasons, and because the Overbagh hanger model obviously does not represent the construction shown in the Overbagh patent. Also, because it is not admissible to ask the witness what he considered some other person would have done.

A. I wish to eliminate entirely the Overbagh hanger and combination, as it essentially differs from the Brill and Peckham hangers, for the reason that in the Brill and Peckham hangers the absolute free play is not present, as is in the Overbagh hanger. Both the Brill and Peckham hangers have a cushioning effect, by reason of a side motion on the spiral spring; in so far as the Brill and Peckham hangers are concerned, they are practically parallel in results, with the exception that the Peckham type permits, if any, a freer motion, cushioned, of course, due to its somewhat longer rod or support.

The free play referred to in the Brill and Peckham hangers are words used to distinguish between the spring-cushioned longitudinal play in them, as compared to the non-cushioned play of the Overbagh.

In so far as the question of the preference of the use of the Brill hanger, as compared to the Peckham hanger, the results, as stated above, are parallel, and a skilled mechanic would be influenced in the selection of either upon the same grounds that evidently entered into the design of the two trucks. The Brill truck is a wrought frame; the Peckham a cast frame.

(Complainants' counsel object to the use of the model which has been shown to this witness and called the Overbagh hanger, because it has not been proved in the case and because, it does not represent the Overbagh patent or anything else in evidence in the case. The Overbagh patent is the only proper subject for examination in this connection; also the Overbagh patent or hanger are not

proper subjects for cross-examination. Notice is given to strike out and tax.)

X Q. 46. The last paragraph of your last answer would be the same would it not, if instead of the Peckham and Brill  
467 hangers, any other hangers had been provided which would, as a matter of fact, obviate the two defects above mentioned, namely, lack of the required longitudinal play of the elliptic and hangers and lack of proper cushioning means for this play?

(The same objections are made; also that the question is vague and too uncertain, as referring to "any other hangers," to be admissible; also as irrelevant.)

A. If the other hangers referred to by you had all the qualities of the Peckham and Brill hangers, the same, of course could be substituted.

X Q. 47. If they were similar in results, so far as providing longitudinal play for the elliptics and shackles of Thyng, and in providing the desired cushioning, your answer would be the same, would it not?

(Same objections.)

A. Well, as I understand the question, it is repeating the same question.

X Q. 48. Please mention the names of manufacturers of pivotal center bearing four wheel trucks (not Maximum traction), which are used on electric railways in this country.

A. There are two classes of trucks used in this country at the present time, each class representing a certain use, the one class is that under which the 27-G and 14-B-3 come under, know- and recognized as city, suburban and semi-interurban work. The manufacturers of trucks of this character are Brill, Peckham, the St. Louis Car Co., Taylor, Baltimore Car Wheel, and, I think, the Maguire.

The second class is of the Master Car Builders' pattern, used for heavy traction, interurban, elevated railway, where very heavy power requirements exist, and wherein no objections exist as to the height of the car from the ground, length of wheel base and all the other elements which so clearly differentiate the two classes. The second class is the development of only the last three or four years, and is brought about by the results obtained from the inventions of the 27-G and 14-B-3 trucks. The second class of trucks is manufactured by the Baldwin Locomotive Works, Brill, Peckham, in fact, all the truck builders of any size in the country.

X Q. 49. About how many truck builders of the sort mentioned are there in the country?

A. I should judge there would be about a dozen builders of the second class, the Master Car Builders' type.

X Q. 50. In your answer to cross-question 48, what do you mean when you say that "the second class is the development of only the last three or four years, and is brought about by the results obtained from the inventions of the 27-G and 14-B-3 trucks"?

A. The development of heavy traction work is purely the results of the practical demonstration of the financial successes in the use of the double-truck cars, whose operation was only permitted immediately following the invention and radical departure in truck construction, as embodied in the 27-G and 14-B-3 trucks.

X Q. 51. In answer to question 37, you state that the development of this broadened electric railway business began in about 1898, and that "the investment of millions of dollars" was "attributable to no other reason than the opportunity offered by the use of trucks of the above mentioned description" (referring to 27-G and 14-B-3 trucks). Wasn't this development due rather to the fact, looking at the matter from a broader point of view, that the panic of 1893, which left the country prostrate, had, with the ending of the Spanish War, lost its influence, and the electric railway business received the impetus which every trade in the country experienced?

A. The first motors run by Sprague in Richmond, in about 1887, incidentally was not influenced by the Spanish War, and each step in the development thereafter was born and created as the exigencies arose. The business grew and developed rapidly. We had 16-foot car bodies, then 18, then 20, and finally 22, mounted on single trucks of the Brill patent.

The next epoch in consecutive order, and following immediately upon the requirements for the increasing business brought out the larger and larger car bodies and these were mounted upon Maximum traction trucks, Brill make.

The next epoch showed the necessity for higher speeds and a larger capacity in motors made up in multiple equipments rather than fewer motors of larger capacity. This led up to the 27-G and 14-B-3. The successes following brought us to the practice of today, using both systems of trucks as referred to in the previous answer.

X Q. 52. Please mention the important cities which you know of in which Master Car Builders' trucks are used on electric railways.

A. In my observation the Master Car Builders' truck is not used in strictly city use. The Master Car Builders' truck is used in New York on the Elevated system, in the Subway, New York, the Brooklyn Elevated, Chicago Elevated, the Boston Elevated. There are a few roads of strictly interurban character run into Cleveland, Ohio, and in Cincinnati using the Master Car Builders' truck.

X Q. 53. Are they also used in Baltimore?

A. The last conversation I had with Mr. H. Adams, master mechanic of the Baltimore system, about a week ago, in discussing trucks, made no reference to the Master Car Builders' truck.

X Q. 54. Have you any idea, and if you have, please develop it on the record, as to the approximate number of trucks (pivotal center-bearing four-wheel) of the first class, which you mentioned in answer to cross-question 50, as that to which 27-G and 14-B-3 trucks belong, put out by the St. Louis Car Company, Taylor, and Baltimore Car Wheel Company?

A. I am not in the truck manufacturing business, and therefore anything I would state would be purely conjectural. I do know that there are about 1000 electric railways in the United States, and



offhand, would state that the average number of cars per road would be 20 cars, making in all about 20,000 cars. This, of course, may be materially modified and increased by the very large development in the last few years in interurban work. The center pivotal 469 truck, the 27-G and 14-B-3 type I know is the current practice for strictly city and suburban work.

X Q. 55. What is the character of the spring hanger used on the 27-G truck upon your road?

A. The type of spring-hanger which is used on the trucks on the Camden and Suburban Railway line was the earlier type, with the bolt supporting the spring running through a hole in the truck frame. The type of support on the trucks owned by the company I am now with are of the outside strap pattern.

X Q. 56. How long have you been with your present company? how many 27-G trucks having the strap hanger encircling and not passing through the side frame, do you use? and where were the motors hung on the 27-G trucks of the old type which you have mentioned?

A. Since March, this year (1905); my recollection is that three of them have the strap hanger in the present company. There has been no change in the method of hanging motors in any of the 27-G trucks; the motors in all instances hung out and away from the center, not between the axle and bolster.

X Q. 57. Are you the Walter E. Harrington who testified in the suit of John A. Brill against the North Jersey Street Railway Company?

A. Yes.

X Q. 58. When were center-bearing pivotal trucks, other than the Maximum traction type, put out by the St. Louis Company?

A. My recollection is about 1900.

X Q. 59. Do you mean of the present construction?

A. I mean the center-bearing type; they have modified in many respects the type that I referred to as coming out in 1900. Their chief work has been in the line of the Maximum traction-truck and the Master Car Builders.

X Q. 60. Do you know of any pivotal center-bearing trucks, not Maximum traction put out prior to 1900, other than the Brill and Peckham here in suit?

A. I am not familiar with any other than the Master Car Builders' pattern. I have in mind the Taylor Truck Company of Troy, N. Y., and they were exploiting their M. C. B. truck in about 1899.

X Q. 61. Please state whether excellence of roadbed, motive power and strength of equipment are the chief requisites for high-speed electric travel?

A. Yes; and in addition thereto, heavy rails, trucks having long-wheel base for high-speed electric travel. I understand your question particularly applies to interurban high-speed service.

X Q. 62. Looking at "Complainants' Exhibit, Pyott Photograph No. 1," please state whether or not any strain brought upon the rigid shackles, longitudinally of the truck, by the imposition of weight

upon the semi-elliptics, would be diminished if the shackles were pivoted somewhat more loosely.

A. Yes.

470 X Q. 63. You have stated in your answer to cross-question 45, that absolute free play is not present in the Peckham hangers of 14-B-3 truck. Please state how freedom of play is restricted.

A. I qualified the words "free play," defining that in the Peckham and Brill trucks the play was spring-cushioned, while in that of the Overbagh model the play was unrestricted, permitting it to sway without any spring cushioning.

OFFICE OF CLERK OF U. S. CIRCUIT COURT,  
POST OFFICE BUILDING, PHILADELPHIA,  
June 30, 1905—11 a. m.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., U. S. Commissioner; Francis Rawle, Esq., and Joseph L. Levy, Esq., for Complainants.

Mr. RAWLE states: The adjournment at the close of the last meeting was, as stated on the record, to Friday, June 30, 1905, at 11 o'clock A. M. Counsel for the complainants having waited until the hour of 11.30, request the special examiner to direct the taking of testimony on behalf of the complainants to proceed.

The special examiner so directs.

Complainants' counsel offer in evidence a certified copy of the drawing as originally filed of Letters Patent of Levi B. Thyng, No. 4276, dated May 17, 1845, which is marked "Complainants' Exhibit, Certified Copy, Thyng Patent Drawing."

MELVILLE L. SOMMER, a witness, called upon behalf of the complainants, having been duly sworn, testified as follows:

Q. 1. State your name, age, residence and occupation.

A. Melville L. Sommer; age, 19 years; residence, 1926 Berks Street, Philadelphia; occupation, draughtsman.

Q. 2. State what training you have had for that occupation.

A. I was educated in the public schools of Philadelphia; took a degree from Temple College, Philadelphia, in June, 1904. I have had three years' experience in draughting in the Baldwin Locomotive Works, beginning in 1901 and ending in 1904. I am now in the employ of the J. G. Brill Company as draughtsman since June 2, 1905.

Q. 3. State what class of drawings you have worked on at the Baldwin Works and at the Brill Works.

A. At Baldwin's I had two years' experience in the construction and building of machines and one year's experience in drafting locomotives. At Brill's I have had, since June 2d, experience in the draughting of cars, details and trucks.

471 Q. 4. I hand you copy of "Defendant's Exhibit, Buck 1871 Patent," being letters patent to C. S. Buck No. 112,897.

Please state whether or not you have made a drawing or drawings from this Buck patent.

A. I have and here produce it.

Q. 5. To what scale, relatively to the drawings of the patent, did you make this tracing of the drawing which you now produce?

A. Six times the size of the patent.

Q. 6. State whether or not this tracing accurately represents the drawings of the Buck patent.

A. It does.

Q. 7. I observe on this tracing which you have produced three structures. Which of them represent the two drawings of the Buck patent?

A. The upper one and the one in the right-hand side.

Q. 8. What is the drawing in the lower left-hand side of this tracing?

A. That represents a side elevation of the other two views.

Q. 9. From what did you make this last-mentioned side elevation?

A. I made it from the other two views out of my head.

Q. 10. State whether or not, as an experienced mechanical draughtsman, you believe that this last-mentioned side elevation properly and correctly represents a side elevation of the truck structure shown in the two drawings of the Buck patent.

A. It does.

(The tracing produced by the witness is offered in evidence and is marked "Complainants Exhibit, Enlarged Buck Patent Drawing.")

(Complainants' counsel states that now the hour is 12.10, the witness is ready for cross-examination on behalf of defendant's counsel.)

(Defendant's counsel not being present, complainants' counsel requests the special examiner to permit the deposition to be closed and the witness withdrawn from the stand.)

(The special examiner so directs.)

WALTER S. ADAMS, a witness called upon behalf of the complainants, having been duly sworn, testified as follows:

Q. 1. Have you previously testified in this cause?

A. I have.

Q. 2. In addition to the work you have done in your business, as already testified to by you, please state whether or not you have given attention to devising and inventing any car trucks or other devices connected with the electric street railway business; and if so, to what extent?

A. I have devoted considerable time to inventing in this line, and have taken out quite a number of patents of the United States. Among them are Letters Patent No. 513,226, dated January 23, 1894, to Walter S. Adams, assignor to John A. Brill, for motor supports to motor trucks. I have taken out altogether some 25 to 30 patents of the United States, relating to cars and trucks, the greater proportion being for trucks.

472 Q. 3. I hand you "Complainants' Exhibit, Thyng Patent Drawing," "Complainants' Exhibit, Certified Copy Thyng

Patent," being a certified copy of the specification forming part of the Thyng Patent, "Complainants' Exhibit, Pyott Photograph No. 1," and "Complainants' Exhibit, Pyott Photograph No. 2," and ask you to state what you know about the things therein illustrated.

A. The copy and the specification of the patent referred to, one of which is marked "Complainants' Exhibit, Thyng Patent Drawing," and the other is marked "Complainants' Exhibit, Thyng Specification," also a blue print marked "Complainants' Exhibit, Thyng Enlarged Drawing." The first two were sent to me by Mr. Joseph L. Levy; the blue print was made from a certified copy of the original drawing of the Thyng Patent, such as is "Complainants' Exhibit, Certified Copy, Thyng Patent Drawing," offered in evidence today. Written instructions that some person not employed by the J. G. Brill Company should construct a set of trucks in accordance with these specifications, the drawings and the patent. The person selected was Mr. Louis T. Pyott, who had these trucks constructed at the works of the J. G. Brill Company, and photograph No. 1, which has been handed me, shows one of these trucks after it was completed. Photograph No. 2 shows one of these trucks with a car body mounted thereon.

I gave Mr. Pyott instructions to follow specifically the drawings and specifications of this patent in the construction of these trucks.

Q. 4. If any trial was given these trucks, state what it was.

A. These trucks were tested by mounting a car body on them and putting 80 persons in the car, the car remaining stationary on the track, both with and without the load of 80 passengers.

Q. 5. Was the test which you have just spoken of as severe a test as would have been the case had motors been placed upon the pair of Thyng trucks and the trucks and car put in actual service under the conditions which the Brill 27-G and Peckham 14-B-3 trucks are required to meet in electric street railway traction?

A. By no means. The connections at the ends of the semi-elliptic springs are not made to allow the semi-elliptic springs to elongate when the car and load are imposed on them without straining and bending the different parts. This also prevents the free lateral movement of the springs and would not allow the truck bolster to come in contact with the transoms of the truck, as it should, when car is in operation of starting and stopping.

By the bolster not coming in contact with the transoms—by this I mean, without additional strain on the links—the strain of starting and stopping the car would have to come on the semi-elliptic springs, and, in fact, all the motions of the car body would be on the semi-elliptic springs and the links. In a properly constructed truck, the support of the semi-elliptic spring at its ends would allow for a free movement in any direction, without bringing an undue strain on the links and the spring. By a properly constructed, I mean like the Brill 27-G and Peckham 14-B-3.

473 The heavier the load on the Thyng truck the greater the strain on the links of the spring would be.

With motor mounted on the Thyng truck and in service, they would have to start the car by the motors revolving the wheels,

which are on the axles, from the axles to the journal box, from the journal box to the pedestal, from the pedestal to the truck frame, through the links which supports the ends of the semi-elliptic springs, from the semi-elliptic springs to the bolster and the bolster to the car, thereby bringing all the strain of propelling the car on the links and spring; whereas, in the Brill and Peckham trucks this strain is not present, as it is taken up by the bolster coming in contact with the transoms of the truck, or *vice versa*, and thereby relieving the spring and links of such strain.

Recess.

Q. 6. Are the shackles in the Thyng truck, illustrated in the Pyott Photograph No. 2, splayed outwardly as much, and are the semi-elliptic springs in that truck flattened out as much, as they respectively would be were that car loaded to anything near its designed carrying capacity?

A. No. If the car was loaded these springs would become entirely flat and this would give additional strain to the links. The car as shown in photograph No. 2 did not have any passengers in it when the photograph was taken, as the car body is a 28-foot body with a 5-foot platform, a car of this size would frequently carry as many as 150 passengers. With this number of passengers the spring would become straight and splay the links to their maximum distance apart. This splaying would be a continued strain on them until the passenger load was removed from the car. When the passenger weight was removed from the car this strain would be somewhat relieved, but not entirely removed. As I have previously stated, the photograph represents the spring with weight of the empty car body only. When this car was loaded with eighty passengers the spring became more flat, which gave additional splay to the links than is shown in the photograph. In fact, when the car had the load of eighty passengers and standing still, the semi-elliptic springs were substantially flat with the links splayed to their utmost.

Q. 7. As splayed outwardly, as illustrated in photograph No. 2, or even to a greater extent, as you have above testified, are there any dangerous strains present in the parts or elements of the shackle or link supports of that truck? I ask you to answer this question both from your knowledge, generally acquired, and from your observation of the tests of those trucks.

A. Both from my knowledge of the trucks in question and that which I have acquired from experience, my answer is that there is a strain on these links which is not provided for. This strain would cause crystallization, due to the varying loads carried by a car in service. This is due to the bending and rebending of the different parts of the links, in one case, where the car is loaded and the links have their greatest splay, and again, when the car has few passengers, the links having their least splay. As there is no provision

474 made for the links splaying, it has to accomplish it by bending the metal parts in a manner that will cause crystallization.

When I speak of the links, I, of course, include the entire connection between the truck frame and the ends of the semi-elliptic spring. If the links should be strong enough to resist the bending, it would then come either in the pins connecting these links or in the bottom, stirrup or the top bolt, which would cause them to bend or break if put in actual service.

Q. 8. Would the conditions which you have just above enumerated be aggravated if those two trucks were put in operation under the car mounted on an electric road, with motors on the trucks and subjected to the usual service?

A. Yes.

Q. 9. To what extent?

A. To a considerably greater extent.

Q. 10. What, in your judgment, would be the result of operating this pair of Thyng trucks under the car body, which is mounted thereon, in actual service under prevailing conditions?

A. In my judgment, the shackles would break if this truck was put in actual operations. This would apply particularly if the car ran at a fairly high rate of speed, which owing to the imperfect alignment of the track, would keep the springs continually working, causing quick bendings and rebendings of the links.

Q. 11. What, if any, effect would the operation of, say, two powerful motors, such as are employed in the present practice, have upon the semi-elliptic springs and shackles of the Thyng truck, especially in starting and stopping motors, or the simultaneous or independent application of the truck brakes, were these trucks put in active and actual operation under prevailing conditions?

A. All of these conditions would aggravate the strain that I have previously testified as coming on the spring or the links. The most of these conditions would come at one time, giving additional strain, first in one direction and then in another; sometimes only one of these strains would be present on the springs and links; and at other times two or more would be present at the same time.

Q. 12. Knowing what you do of these trucks and of the requirements of electric railway practice as it exists and has existed since the year 1895, would you advise the actual use with electric motors of these trucks in actual service?

A. No, I would advise against their use, on account of their being unsafe.

Q. 13. Did the J. G. Brill Company have proper facilities for operating this car and those trucks, or could such facilities have been readily obtained had the actual and active operation of those trucks been decided upon?

A. Yes, they have facilities for testing these trucks with motors. The trucks, however, would have to be modified before motors could be used on them, as there is not sufficient space between the  
475 bolsters and the axle to hang a motor within the wheel base, nor sufficient space to hang it outside the wheel base without modification.

Q. 14. Have you made any drawings illustrating the testimony



you have just given with regard to the trucks of the Thyng patent and the trucks built thereunder by Mr. Pyott?

A. I have had a drawing made and produce it.

Q. 15. Please proceed to explain this drawing.

A. This is a brown paper drawing. It was made under my direct instructions and supervision; it relates to the trucks made by Mr. Pyott under the Thyng patent. The upper drawing marked "5" represents a section of the side truck frame, the ends or the bolster parts, the half-elliptic springs and the shackles, which are drawn to a scale to represent the corresponding parts of the Pyott Thyng truck. The object of these drawings, which I am now about to explain, is to show the construction of the Thyng truck, following proper shop practice in truck construction, but adhering to the disclosures of the Thyng patent.

The proper truck practice is to make semi-elliptic springs a given length after the initial load, which is the weight of the empty car body, has been placed upon them. Their given length is what they will assume after the weight of the empty car body has been placed upon them. This is necessary, because the links must assume a vertical position when carrying the weight of the empty car body; otherwise, the weight of the empty car body alone would depress the spring and splay the links.

This initial pressure on the springs is obtained by inserting the bolster, which is attached to the semi-elliptic spring at its center, under the side truck frame.

In making the drawing produced by me, which is numbered 5, I followed this practice: The spring of the Thyng patent is shown under initial pressure, the bolster, which is the bolster of the Thyng patent, is shown as pressing up against the under side of the truck side frame; the links which are the links of the Thyng patent are shown as in a vertical position.

Proper truck practice requires, in my opinion, that trucks built under the Thyng patent should be built in accordance with the theory of the proper truck practice, above stated, I mean, and in accordance with the drawing marked "5," which shows an initial pressure on the semi-elliptic spring; this drawing No. 5 represents the springs and links and bolsters in the position which they must assume under proper practice. The upper drawing on this sheet which I produce represents the spring, links and bolster in the position which they would assume under the weight of the empty car body, or almost so; that is, in practice, the initial pressure put on the half-elliptic springs is just a trifle less than would be the pressure or weight of the empty car body, the amount of difference being just sufficient to ease off the bolster from actual contact with the under part of the side truck frame when the car body is imposed. The difference between the initial pressure and the pressure exerted by the empty car body is slight, and the amount by which the bolster is thus eased off from the side truck frame is also slight.

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The second drawing on the sheet which I produce is the drawing which I have marked 5-A, represents the relation of

the semi-elliptic spring, the links and the bolster to the side truck frame when the car body is imposed and when it carries a load of passengers. As I have testified, I saw the Thyng trucks with a car body and a passenger load on them of eighty men, not a full load, and the half-elliptic springs were then substantially flat, and I have shown them in 5-A in that condition.

This drawing 5-A shows a considerable splay of the links due to the flattening of the half-elliptic spring; it is drawn to scale. The amount of the splay is accurately represented; it shows accurately the amount of extension of the half-elliptic spring bolts measured when the spring is flat as it is in the drawing marked 5-A.

The drawing in the lower left-hand corner is a full-sized representation of a part of one of the Thyng links where it is connected with the bolt passing through the truck side frame. It shows the side plates of the links somewhat separated from the sustaining bolt; it also shows the pin which connects the plates of the link with their sustaining bolt as having a neat fit. With the parts thus constructed and assembled the effect of operating the truck would be to bend the pin to the position which I have shown in this drawing marked "6."

The drawing on the sheet produced by me marked "6-A" shows the like parts of the Thyng link and sustaining bolt and section of the side frame assembled without any separation between the plates of the link and the sustaining bolt and with a neat fit of the link pin. The effect of the operation of the Thyng truck, with the parts so constructed and assembled, is, in my opinion, accurately shown in this drawing marked "6-A." The link and sustaining bolt are there shown as splayed and the bolt is shown as bent at its point of juncture with the truck side frame.

In the drawing which I have marked "6-B" there is a looseness or separation between the plates of the link and the sustaining bolt, and the pin which connects these parts has a loose fit in the links. If a Thyng truck were thus constructed and assembled and operated, in my opinion, the parts shown on 6-B would assume the position there illustrated. That is, the plates of the links would ride or rest on their edges upon the pin. In my opinion, the effect of this would be neither to bend the pin or to sheer it off.

Each of these three figures, 6, 6-A and 6-B, represent correctly the same amount of splay of the link parts as is shown in the drawing marked 5-A. In my opinion, this is all entirely unmechanical, and would be very dangerous in practice. I do not believe that any street railroad man would be willing to allow a truck so constructed to be operated on his road, much less to purchase it.

The sheet of drawings on brown paper, produced and testified to by the witness, is offered in evidence, and is marked "Complainants' Exhibit, Adams Illustrative Drawing."

The special examiner directs that the following telegram and his reply thereto be spread upon the record:



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NEW YORK, *June 30, 1905.*

Sam'l Bell, Clerk U. S. District Court, U. S. Post Office Bldg.,  
Phila., Pa.:

Brill versus Washington cannot attend testimony Saturday and protest against proceeding then page sixty Complainants prima facie proofs request made to proceed Saturday, you upheld refusal, accordingly you should uphold present protest. Please wire date adjournment.

WARFIELD &amp; DUELL.

240 Pm.

JUNE 30, 1905.

Warfield & Duell, 220 Broadway, N. Y.:

Have obtained Rawle's consent to an adjournment until Wednesday at ten-thirty and it is so ordered. To-day's meeting has proceeded under my orders.

SAMUEL BELL.

Collect.

By direction of the special examiner, the meeting is adjourned to meet at this office on Wednesday, July 5, 1905, at the hour of 10.30 o'clock A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, *July 5, 1905.*

Met pursuant to adjournment at the office of Samuel Bell, Esq., at 10.30 o'clock A. M.

Present: Samuel Bell, Esq., U. S. Commissioner; Francis Rawle, Esq., and Joseph L. Levy, Esq., for Complainants; Warfield & Duell, for Defendant.

(Defendant's counsel objects to the following exhibits, offered in evidence at the previous session:

"Complainants' Exhibit, Adams Illustrative Drawing."

"Complainants' Exhibit, Enlarged Buck Patent Drawing.")

(The foregoing objection is made on the ground that both exhibits are incompetent, certain figures thereon, notably Figs. 5-A, 6, 6-A and 6-B of the former exhibit, and the lower left-hand figure (side elevation) of the latter exhibit being not only irrelevant, but speculative, and the last figure (side elevation) being manifestly incorrect in respect of the proportion of the semi-elliptic spring there illustrated.)

478 (Defendant's counsel reserves further objections, pending the production for cross-examination of complainants' witness, Melville L. Sommer, who, defendant's counsel states, will be produced for such purpose.)

(Complainants' counsel objects to the objections as not having been taken at the proper time.)

Defendant's counsel replies that the witness in question was a "dark horse," opposing counsel having stated at the previous session that Walter S. Adams was the witness who would be examined.

WILLIAM G. PRICE, a witness called upon behalf of the complainants, having been duly sworn, testified as follows:

By Mr. RAWLE:

Q. 1. State your name, age, residence and occupation.

A: William G. Price; age, 49 years; I live at Butler, Pa., and am an engineer by profession.

Q. 2. What is your present employment?

A. I am manager of the electric car truck department of the Standard Steel Car Company of Pittsburgh, Pa. Their works are at Butler, Pa.

Q. 3. Please state the nature of your education for this profession, and the general course of your business connections until you took your present position.

A. I was educated at the public schools of New York. I was a special student at the Troy Polytechnic Institute at Troy, N. Y., and at Columbia College, N. Y., and I was given a four years' course in engineering and higher mathematics by an engineer by the name of J. H. Serviss, who now lives at Englewood, N. J.

In 1878 I was employed by the N. Y. C. R. R. Co.; in 1879 I entered the employ of the United States Government, in which I remained on river and harbor work until January, 1896, when I entered the employ of the Chicago City Railway Company as engineer and confidential assistant to the superintendent, and afterward to the president of that company.

In September, 1898, I entered the employ of the Peckham Motor Truck and Wheel Company at Kingston, N. Y., as superintendent of their works.

In September, 1899, I was promoted to engineer and general superintendent, and in January, 1901, I was made engineer and assistant manager; the new company, the Peckham Manufacturing Company, was formed in the early part of 1901, and I held that position in that company; I held that position until I left their employ in March, 1903.

Since then I have been in the employ of the Fentress Mining Company, of Greensboro, N. C. I did some work for Mr. E. G. Nicewaner, superintendent of highways and sewers of the city of Pittsburgh, and in the early part of 1904 I entered the employ of the Standard Steel Car Company. I did some truck designing for them before that time.

Q. 4. Since January, 1896, when you went to the Chicago City Railway Company, to what extent has your work run along the lines of truck construction and operation?

A. It was during the year 1896 that I was ordered by the superintendent of the Chicago City Railway Company to visit different cities and study the operation, especially of double trucks of all kinds then in use, and I went to Washington, to the Patent Office, and examined all the patents of trucks I could get hold of. This was done with a view of developing double trucks for the Chicago City Railway.

In the year 1897 I also made quite a number of experiments with

different changes and designs of trucks for the Wells & Franch Company, who were then manufacturing the Curtis truck. I made many tests of these trucks to try to determine the best arrangement of parts and of springs for the same.

In September, 1898, I was employed by the Peckham Motor Truck and Wheel Company. My mind was constantly employed in the building and designing of electric trucks and trying to improve the same.

Q. 5. What pivotal trucks had the Peckham Company on its list when you went there in September, 1898?

(Question objected to as indefinite, incompetent and irrelevant.)

A. Their designs which they had been and were manufacturing were the No. 14, No. 14-A, No. 14-B, No. 15 and No. 16. They also had the Maximum traction type of truck, with big and little wheels.

(The foregoing answer is objected to on the grounds stated relative to the question, and more specifically as dealing with the Peckham Motor Truck and Wheel Company, not a party to this cause, nor having any connection therewith.)

Q. 6. What connection did Edgar Peckham have with the two successive companies you were employed by?

A. He was president of each of those companies, and I worked under his direction.

Q. 7. State whether or not at the time you went there, in September, 1898, the Peckham Company had begun to build their 14-B-3 truck.

A. They had not.

Q. 8. Can you produce an advertisement of the Peckham Motor Truck and Wheel Company, giving cuts of the various types of trucks which the company was selling or offering for sale when you went there in September, 1898?

(Question is objected to as manifestly incompetent, irrelevant and immaterial, and as calling for secondary evidence.)

A. I produce a copy of the *Street Railway Journal* of October, 1898, containing an advertisement of the Peckham Motor Truck and Wheel Company.

Q. 9. State whether or not you recognize this advertisement as being an advertisement of that company.

(Same objection.)

A. I do recognize it as such.

(Complainants' counsel offers in evidence the copy of the 180 *Street Railway Journal* produced by the witness, and the same is marked "Complainants' Exhibit, *Street Railway Journal*, October, 1898.")

Q. 10. Please indicate the pages of this journal upon which appear cuts of the types of truck you have just mentioned.

A. No. 14 appears on page 25.

No. 14-A appears on page 26.

No. 14-B appears on page 27.

The top cut on page 28 shows a No. 16 truck, which is sometimes called the "Jersey Special."

The bottom cut on page 28 is one form of the Maximum traction truck.

The top cut on page 30 shows a No. 15.

Where there are two cuts of the same designated truck on the same page, they differed in some detail of construction not relating to the spring support.

(Counsel stipulate that photographic copies of these cuts may be substituted on the record for the *Street Railway Journal* produced by the witness with the same effect as the original, copies to be furnished to defendant's counsel subject to the same objection as made to the original evidence.)

Q. 11. State whether or not in September, 1898, the Peckham Company had built and sold any 14-B-3 trucks.

(Objected to as incompetent and irrelevant.)

A. No.

Q. 12. State whether or not they had at that time sold any No. 16 or "Jersey Special."

(Same objection.)

A. They had.

Q. 13. How about No. 15?

A. Yes, they had sold some of the 15.

Q. 14. What, if anything, had you to do with the designing of the 14-B-3 truck? Tell the history of that.

(Same objection, and as calling for secondary evidence apparently tending to contradict the grant of U. S. Letters Patent to C. F. Uebelacker, No. 635,986.)

A. It was in November or December, 1898, that Mr. Uebelacker, working in the office at night, made the first general drawing of the 14-B-3 truck, and I assisted him in working out some of the details.

Q. 15. Were these working drawings for shop use?

A. Yes, it was the working drawing, but details of all the parts were completed by the draughtsman under Mr. Uebelacker.

Q. 16. State whether or not this was before any 14-B-3 trucks had been built.

A. It was.

Q. 17. When were the first 14-B-3 trucks completed and shipped thereafter.

A. Some time in the year 1899; I do not remember the exact date.

Q. 18. State whether or not, after you had made those working drawings for the 14-B-3 trucks, you designed or made drawings for a truck having a different truck designation.

A. In October, 1899, I designed a truck called 14-B-6.

Q. 19. Under whose instructions did you do this?

A. I made the design by request of Mr. Edgar Peckham.

Q. 20. What did he tell you?

(Objected to as irrelevant and secondary.)

A. Mr. Peckham said to me: "The court may decide that the 14-B-3 truck is an infringement of the Brill 27-G truck, and I want you to design another truck that can compete with the Brill 27-G.

(Complainants' counsel call upon defendant's counsel to produce some of their advertising matter showing a cut of the 14-B-6 truck.)

(Defendant's counsel replies that no notice to produce has been served; he has not such a cut in his possession, and the call being manifestly improper, upon the additional grounds of irrelevancy and incompetency, he is, perforce, unable to comply therewith.)

Q. 21. State whether or not you designed a 14-B-6 truck completely, as designed by Mr. Peckham.

A. In accordance with his order, as I have stated, I designed the 14-B-6 truck, with all details for shop use.

Q. 22. Were any built and sold?

A. Yes.

Q. 23. Was it advertised with a cut?

A. It was advertised in the *Street Railway Journal* with a cut.

(Call repeated.)

(Same answer.)

Q. 24. After the Peckham Company, in 1899, had begun to build and sell 14-B-3 trucks, state which type of trucks as between their 14-B-3, 14, 14-A and 14-B, the Peckham Company most largely sold.

A. Most of the sales were of the 14-B-3 type. The 14-A truck was designed for entirely different service, or for heavy interurban and elevated cars, while the 14-B-3 was intended for city services. There were quite a number of the 14-A trucks sold. 14 and 14-B were sold for city service.

When we began manufacturing the 14-B-3 truck, the sales of No. 14 and 14-B entirely stopped.

Recess.

Q. 25. From that time on, what trucks did you sell for city use?

A. We sold the 14-B-3 truck and the Maximum traction trucks. The 14-B-3 truck was also sold for interurban service in New England.

Q. 26. Broadly speaking, what was the spring system of the 14-B-6 truck, which you say you designed under Mr. Peckham's orders?

A. Broadly speaking, it was substantially the same as 14-B-3. The springs were in the interior of the truck; it did not have half-elliptic springs longitudinally arranged and suspended from the side frames.

482 Q. 27. You have stated that when you began to manufacture the 14-B-3 truck the sales of the 14 and 14-B "entirely stopped." How far is this true during your entire connection with the Peckham Manufacturing Company, when you left them in March, 1903?

(Objected to as manifestly incompetent, irrelevant and secondary.)

A. It covered the whole period, except that we did sell some 14-B trucks to the Third Avenue Railway Company, in New York city. These Third Avenue trucks were ordered about the time that the 14-B-3 truck was perfected.

Q. 28. Can you give an approximate idea of the extent of sales by the Peckham Companies of the 14-B-3 type of truck between its introduction and March, 1903, when you left them?

(Objected to as being manifestly incompetent, irrelevant and speculative, as well as secondary.)

A. We sold some thousands of these trucks, but I cannot give a close estimate of the number.

Q. 29. If there was a 14-B-3-X, state whether or not it had the same spring support system as the 14-B-3.

A. A 14-B-3-X truck was manufactured and sold, and it had the same spring support system as the 14-B-3.

(At this stage of the proceedings, a previous witness, Melville L. Sommer, was produced for cross-examination, at the request of defendant's counsel, but after consideration, the latter stated that he did not wish to cross-examine the witness, and the witness thereupon withdrew.)

Q. 30. Reference has been made to two successive companies; can you state the relative times at which they carried on the truck business at Kingston, and the general business connection between them?

(Question is objected to, as being incompetent, irrelevant and indefinite in the assumption of a business connection.)

A. Up to about January, 1901, the business was carried on by the Peckham Motor Truck and Wheel Company, and after that date by the Peckham Manufacturing Company. About the time that the Peckham Manufacturing Company took charge of the business, a new plant was constructed and the machinery moved into it, the old plant having been rented, and did not belong to either company.

Q. 31. What part of the assets and business of the old company was taken over by the new company?

(Same objection.)

A. All of the business and assets of the old company were taken over by the new company.

Q. 32. Who filled the outstanding orders of the old company?

(Same objection.)

A. They were filled entirely by the new company.

Q. 33. To what extent was the continuity of the old company's business kept up by the new company, in the matter of officers, employees, patterns, patents and the kind of trucks made and sold; also material on hand, stock, castings, etc.?

(Same objection.)



483 A. There was no break in the continuity of manufacture; the same trucks were manufactured by the new company as by the old, using the same patterns; there was no change in the officers of the company or foremen, and very little change in the personnel of the labor employed. The stock and material left on hand by the old company was used by the new company.

Q. 34. Did the new company start a new series of order numbers or continue with the old series?

(Objected to as incompetent, irrelevant and secondary, the witness necessarily testifying as the result of hearsay, in respect to the previous question, at least.)

A. I had access to all of the books of the company, and know that the system of order numbers was continuous from the old company to the new, and I was continually referring to the books when an employee of both companies.

Q. 35. I hand you "Defendant's Exhibit, Thyng 1845 Patent." Please state whether you have examined this patent and understand the construction therein described.

A. I have, and understand the construction therein described.

Q. 36. State whether or not you find in that patent any provision for a longitudinal swing of the links or shackles which support the semi-elliptic spring.

A. There is no provision shown in the drawings for longitudinal swing of the spring-supporting links or shackles, and no mention of any such movement is made in the specifications or in the claims.

Q. 37. State what, in your opinion, would be the result to these shackles from the operation of a truck built according to the Thyng patent, when loaded and operated, according to modern electric street railway practice, and driven by the usual electric motors mounted on the trucks.

(Objected to as incompetent, irrelevant and speculative.)

A. The tilting of the bolster between the transoms and the lengthening and shortening of the elliptic spring, due to the variable load, would bend these links or shackles and cause some part of them to give way. It is necessary that the links be so constructed that they can swing longitudinally as well as transversely, and in this design of the Thyng patent the inventor had only in his mind, as far as disclosed by the drawing and specifications, provision for a transverse swing.

Q. 38. State whether or not, in your opinion, in the operation of a Thyng truck, under modern electric street railway conditions, the links and the elliptic springs would become involved in starting and stopping the car.

A. In all center-bearing swing bolster trucks there is some play or lost motion between the bolster and the transoms between which the bolster is located. In propelling the car and then in braking or stopping the car the bolster is alternately moved from position against one transom to position against the other transom. The bolster is

484 also, by these forces, tilted to some extent out of a vertical position, and this movement of the bolster carrying the semi-elliptic, which is rigidly secured to it, would cause the hanger links to be bent alternately in one direction and then in the other. The springs would be moved in a longitudinal direction as the bolt moved or is tilted.

Q. 39. I show you "Complainants' Exhibit, Adams Illustrative Drawing." Please examine the various detail drawings on this sheet, and state whether or not the various conditions of the parts as there shown, and their positions, would be as shown on this sheet of drawings, in a truck thus constructed.

(The question and all reference to the drawing in question are objected to as being incompetent, irrelevant, speculative and secondary.)

A. This drawing shows the position the spring and links would be in when a partial and full load is resting upon the springs, or when the spring is supporting the car body without passengers, as in Fig. 5, and with car body loaded with passengers, as in Fig. 5-A. My answer to the question is, they would—confining my answer to the last question to Figs. 5 and 5-A. On further examination of the drawing Fig. 5-A, I would say that the upper shackle pin does not rigidly tie the link plates and the bolt together, as in the drawing of the Thyng patent, but enough play has been allowed in the length of the shackle pin to permit the shackle plates to separate a little from the bolt, as shown in Fig. 5-A of the "Adams Illustrative Drawing," which permits them to swing out of vertical position without bending the bolts.

Q. 40. Please state what strains would be imposed upon the shackle construction, the shackle plates, the bolt and the shackle pin, if the parts were assembled as shown in Fig. 5-A, in "Adams Illustrative Drawing"?

(Same objection.)

A. There will be a bending strain on the shackle plates, and on the bolt, and on the upper shackle pin.

Q. 41. Look at the three detail drawings on this sheet, which are marked 6, 6-A and 6-B, and state whether they illustrate the effect of these strains on the shackle parts.

(Same objection.)

A. Fig. 6 shows a condition as it would occur, with a loose space between the shackle plates and the bolt and the tight-fitting pin. The shackle plates would separate from the bolt and be bent where they are connected at the lower pin and the upper pin would be bent as shown.

In Fig. 6-A, the shackle is shown with the pin a tight fit and no play between the shackle plates and the bolt. In this case the bolt would be bent as shown.

In Fig. 6-B a space is shown between the shackle plates and the bolt, and the pin is a loose fit. In this case the shackle plates would be bent apart and these plates would rock back and forth on the



pin, which would cause the holes in the shackle plates to enlarge rapidly by wear and the pins would also wear rapidly. This wear would be very much increased by the grit which would then get into the parts.

485 Q. 42. State whether or not making the shackle plates and bolts stronger and larger would cure the defects which you have just pointed out.

A. It would be impossible to make them large enough, as shown in Fig. 6-A, to resist the bending strain on the bolt. The same statement applies to the pin in Fig. 6. In Fig. 6-B the increase in size would not prevent sand getting into the parts so as to cause the holes in the shackle plates to enlarge and the pins to be cut away.

Q. 43. If the shackle plates and parts could possibly be made large and strong enough to resist the splaying movement caused by the depression of the half-elliptic spring, state whether or not in such case, if it were possible, this half-elliptic spring would continue to act as a spring.

A. In that case the semi-elliptic spring would not be depressed by the load and would not act as a spring at all. On the contrary, it would be the same as a solid bar.

Q. 44. State whether or not the action of the motors in propelling the car, owing to the play, if any, between the bolster and the transoms, would cause the links to be bent and finally to be broken.

A. They would, as I have explained before.

Q. 45. I refer you to the Peckham 14-B-3 type of truck. Please state what motion of the links and the semi-elliptic spring is provided for in the construction of that truck.

A. A motion in both the longitudinal and transverse direction.

Q. 46. Please explain how this is provided for.

A. The shackles connecting the links to the semi-elliptic springs provide for movement at this end of the link in both the longitudinal and transverse directions. The upper pin in the shackle providing for transverse swing of the link and the pin which connects the clevis with the half-elliptic spring provides for motion in the longitudinal direction so much for the capacity of swing at the bottom of the link. Now at the top of the link the pin in the spring cap which passes in a longitudinal direction through the eye in the upper end of the link provides for a swing of the link in a transverse direction. The depression of the coiled springs on alternate sides permits the longitudinal swing of the links. The coiled springs were always made to fit loosely in their pockets which permitted of movement of the links in both the transverse and longitudinal direction.

Q. 47. In this 14-B-3 truck, state whether or not there is provision in the coiled springs which support the links for a transverse movement to pass into a longitudinal movement and *vice versa*.

A. The tilting of the tops of the coiled springs where they support the spring caps permits the links to swing in any direction.

Q. 48. I hand you "Defendant's Exhibit, Overbagh 1870 Patent." Are you familiar with the construction therein set forth?

A. I am.

Q. 49. I hand you "Defendant's Exhibit, Model Overbagh Spring

486 Hanger." Please examine this exhibit model, compare it with the Overbagh patent, and state whether or not the model is made in accordance with the Overbagh patent.

A It is not so made.

Q. 50. Please explain why not.

A. In the Overbagh drawing the truck frame is shown supported on bars, the bars resting at one end on top of the journal boxes and the bars being hung at the other end on bolts which pass up through the truck frame, and are secured to caps which rest on springs which are carried on top of the truck frame.

In the model a semi-elliptic spring has been substituted for the two bars X D of the patent and the ends of the semi-elliptic springs have been connected to the supporting bolts by shackle, which are not shown in the Overbagh patent drawing.

Q. 51. State whether or not you find any warrant in the Overbagh patent for the support of the semi-elliptic spring in the manner shown in this Overbagh model?

(Counsel for defendant draws attention to the fact that the exhibit in question has been put in evidence as representing the "*Overbagh Spring Hanger*," and not as illustrating what the question seems to purport to cover, namely, the entire or a large part of the truck, illustrated in the patent.)

(Complainants' counsel refers to the testimony of defendant's witness, Freeman, as giving to the Overbagh model a significance other than that just stated on the record by defendant's counsel.)

A. I do not.

Q. 52. Please give your reasons for your answer.

A. The only thing in the model that is shown in the patent is the bolt running up through the side frame and supported on springs which rest on top of the side frame. The semi-elliptic spring of the model and the shackles which connect the ends of the semi-elliptic spring with the bolt are not shown in the Overbagh patent drawing.

Q. 53. Could the shackles of the Overbagh model be used mechanically to support the equalizing bars D of the Overbagh Patent? Please give your reasons for your answer.

A. They cannot. The shackle is prepared to receive the end of a flat spring, while in the Overbagh drawing the bolt is connected to the equalizer bar by what is supposed to be a jaw on the equalizer bar. In the Overbagh drawing there is no provision for transverse swing of the equalizer bar, one end of the equalizer bar resting directly on a pivot on top of the journal box, the equalizer bar at this end cannot swing at all; the other end being connected to a bolt, which passes up through a hole in the side frame, it cannot swing unless this hole is made very large, which is not shown in the drawing. The side frame rests on the equalizer bar close to the end that is supported by the journal box, so that the bolt which passes up through the frame would require a very large movement to permit of any practical transverse movement of the side frame, but as the

side frame is rigidly connected to the pedestals which engage  
487 the lugs on the journal boxes, the side frame can have no  
transverse movement, and none was intended by the in-  
ventor.

In case the shackles shown in the model were substituted in the Overbagh drawing to connect the equalizer bars to the supporting bolts, it would make no difference in the operation of the Overbagh truck as regards a swing of the side frame in any direction, as the ends of the equalizer bars, where they connect to the supporting bolts, must move up and down in an arc of a circle, causing a slight longitudinal movement of the lower ends of the bolts, the shackles would provide for this movement of the equalizer bars, provided the bolts were made to fit closely in the holes of the side frames, which is the form of construction shown in the model.

Q. 54. In the model provision is made for the transverse swing of the lower end of the shackle. Could this arrangement be used in the truck of the Overbagh patent without impairing the support of the equalizing springs or cushions E?

A. No, it wouldn't impair the support of the cushions E unless the swinging action took place, and in that case it would upset the springs or cushions E.

Q. 55. Look at the Overbagh model and assume a truck so constructed on both sides, and having its semi-elliptic springs on the two opposite sides rigidly connected to the bolster, state whether in such a construction this Overbagh model makes any provision for the swing transversely of the half-elliptic spring.

A. It does not.

Q. 56. Assume a truck constructed like the Overbagh model with its semi-elliptic rigidly connected, as by a bolster. In such case would the longitudinal swing of the semi-elliptic springs involve the longitudinal swing of the hanger passing through the side beam and supported on springs or cushions of the side frame and ending in its lower jaw at the point where it connects with the shackles?

A. No, there is no provision for any such swing of the hanger bolt in the Overbagh model.

Q. 57. State whether or not you would make the same answer in a truck so constructed in respect of transverse motion of the semi-elliptic springs as involving or not involving the motion of the hanger.

A. I would make the same statement.

Adjourned to meet Thursday, July 6, 1905, at 10.30 A. M.

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POSTOFFICE BUILDING,  
PHILADELPHIA, *July 6, 1905.*

Met pursuant to adjournment.

Present: Samuel Bell, Esq., U. S. Commissioner; Messrs. Levy and Rawle, for Complainants.

At the adjournment yesterday defendant's counsel stated to the special examiner his consent that the examination of the witness should proceed in his absence, reserving his right to note objections

to the questions and evidence given in case he should be late in his attendance. No other rights to be reserved.

*Direct Examination of Mr. William G. Price, Continued.*

By Mr. RAWLE:

Q. 58. I hand you "Complainants' Exhibit, Buck 1871 Patent." Please state whether or not you understand the truck construction therein shown.

A. I do.

Q. 59. Please describe its construction and mode of operation.

A. This truck shows a bolster spring supported from the frame of the truck. The bolster rests upon half-elliptic springs which are placed approximately in line with the wheels. These springs are connected by shackles to what are called transverse springs, which are supported by a stirrup hung from cross beams of the truck frame in the center line of the truck. The inventor states that "the transverse springs Q R are to have sufficient power to hold up their end on ordinary occasions, in contact with the lower side of the intermediate cross ties; but having sufficient flexibility to be brought into use as springs on any extraordinary occasion." As it is a universal practice of truck builders to design the truck springs so that they will act as springs under all conditions of load, I do not know what the inventor meant by "extraordinary occasions."

(At this point Warfield and Duell appeared.)

The witness resumes: When the load is not sufficient to depress the springs Q R, away from contact with the intermediate cross ties, they would not act as springs at all, and when the load was sufficient to depress the ends of these springs below the cross ties, as these springs are supported in the center on a pivot, which is below the center of gravity of the car body, the car body would tilt to either one side or the other, so that only one end of these springs would be free from the cross ties and the other end would not act as a spring at all. The car body would tilt to one side, and if there was very much deflection to the springs Q R, under this extraordinary load, the car body would be in danger of upsetting or tipping entirely off the truck.

489 The shackles which connect the longitudinal springs O P to the transverse springs Q R bear directly under the cross ties, and the action of the springs Q R forces the top ends of these shackles against the cross ties so as to make heavy friction, which would offer great resistance to the transverse swing of the bolster, which would defeat the object intended to be gained by the use of the spring shackles or links.

It is evident from the design and statement of the inventor that the springs Q R were not intended for use as springs under any ordinary conditions of load. In all practical truck construction springs are made to act as springs under all loads from the lightest up to that which would prevail when a car was crowded to its utmost capacity by passengers. The advantage of having the springs Q R

come into action when the load was greater than this maximum load would be of no value. If the springs Q R were brought into action, the vertical vibration or movement of the bolster, due to inequalities of the track, would cause the ends of the springs Q R to alternately drop below the cross ties and then strike them again so that a severe pounding action would take place, which would be a very inefficient spring action and produce a worse riding condition than if the springs Q R were entirely omitted and the springs O P were hung directly from the truck frame.

In order to produce a truck which will meet the conditions of city service in this country, it is necessary to support the motors between the axles and the end frames of the truck and to reduce the wheel base to four feet, or very near that dimension. A four-foot wheel base being preferable, and a wheel base longer than four feet cannot be used under a large proportion of the city cars in service in this country. The limit of wheel base that can be used on most of the cars, which do not absolutely require a four-foot wheel base is four feet six inches. With a wheel base of four feet six inches, the springs O P, as located in line with the wheels, would be so short they could not act as springs. If the springs O P were brought in nearer the center line of the truck so as to avoid interfering with the wheels, and if it were possible to support them in this position—which I would be unable to do—the stability of the car would be so much reduced that it would rock on these springs and would not be safe or pleasant to ride in.

The only possible location for longitudinal springs, as shown at O and P, is outside of the line of the wheels which would bring them underneath the side frames, and I believe no truck builder has succeeded in constructing a practical truck with longitudinal springs located in any other position. Longitudinal springs placed far apart, so as to be under the side frame, give great stability to the car body, and yet give all the resiliency required for easy riding.

If it were possible to make trucks long enough wheel base for city service so that the motors could be carried between the axles and the bolster, the motors would occupy the space required for the springs Q R, and therefore these springs would have to be omitted, which would again make necessary the carrying of the springs O P  
490 from the side frames. This would also be true with the longer wheel base trucks, as used in interurban service.

The straps or stirrups V, the inventor states are to act as safety loops to sustain the bolster in case of the breaking of a spring. They are shown extending down to about a level with the axle, and would not act at all to prevent the car body from rolling off of the truck, in case the springs Q R should be depressed at one end or the other.

(The foregoing answer is objected to as being speculative, not responsive to and entirely without the scope of answer required by the question.)

(Complainants' counsel asks defendant's counsel to indicate on the record whether he wishes to place thereon any objections to question 58, which right was reserved, as appears by the record.)



(Defendant's counsel replies that objection is taken to question 58, on the ground that it is incompetent, and for the further reason that the witness is not asked if he has read "Complainants' Exhibit, Buck 1871 Patent.")

Q. 60. Please look at "Defendant's Exhibit, Model Buck Truck," and state whether or not, in your opinion, it correctly represents the structure shown in the "Defendant's Exhibit, Buck 1871 Patent." Please give your reasons for any opinion you may give.

(Question is objected to on the ground that it is incompetent, irrelevant and speculative, the witness not having stated that he has read and is familiar with the structure set forth in said patent.)

A. I have read the specifications in the said Buck patent and have studied the drawings very carefully. This model of the Buck patent does not correctly represent that patent. The transverse springs are entirely too weak to represent what the inventor specified and shows. The inventor intended that the longitudinal springs should act as springs under all conditions, and that the transverse springs should be so stiff as to act as springs only on extraordinary occasions; that is, the longitudinal springs are to be very much weaker than the transverse springs. In this model the reverse is shown, as the longitudinal springs are very much stiffer than the transverse springs, and under the action of loads the transverse springs show very much the greater amount of deflection. In this model the stirrups, which are intended by the inventor to act as safety loops only in case of the breakage of a spring, are here in the model made so close under the bolster as to act to check a tilting or rolling action of the car on the bolster, which was not intended by the inventor.

In the patent drawing the top end of the shackle, which connects the two systems of springs, is shown as resting directly under the cross ties, so that the upward pressure of the transverse spring produces heavy friction between these shackles and the cross ties. This friction would act to retard or resist the swing of the bolster on said links and largely overcome the advantage claimed for the swing links.

In the model the ends of the transverse springs rest directly against the under side of the cross sills, and the top ends of the  
491 shackles are placed on each side of the cross sills, so that they have no frictional contact with the cross sills, which overcomes the defect shown in the patent.

The patent drawing shows the longitudinal springs as being located in line between the wheels. The model shows these springs located near the center of the bolster so as to clear the wheel. This change in construction reduces the length of the transverse springs and brings them a little nearer a practicable length. If the transverse springs were made as long as shown in the patent drawing, they would have to be made so large, in order to carry the load, that they would extend down so close to the pavement as to interfere with it, and for this reason alone such springs could not be used.

The model shows a truck frame in a position very much higher

than can be used on any electric railroad of this country. Truck frames are placed as low down as possible, so as to bring the car body low down and make the climb from the street to the car floor as short as possible.

In the model the arrangement of stirrup support at the center of the transverse springs is not the same as shown in the patent drawing, but this variation would make no practical difference in the operation of the spring system.

Q. 61. Assuming that the springs Q R in the Buck patent can act as springs, what equivalency is there between the support of those springs on the one hand and the support of the longitudinal semi-elliptic springs in the Peckham 14-B-3 trucks on the other hand?

(The question is objected to on the ground of incompetency, irrelevancy, and for the further reason that it is speculative.)

A. The action would not be the same in any respect. In order to act anyway like the spring system in the Peckham 14-B-3 truck, it would be necessary to have the transverse springs Q R rigidly connected at their centers to the stirrups which support these springs from the cross sills. This rigid connection would then prevent the tilting of the transverse springs. It would be practically impossible, however, to make such a rigid connection strong enough to resist this tilting action.

Q. 62. In your opinion, as a practical truck man, is the support of the longitudinal springs in the Buck patent a stable support?

(Same objection.)

A. It is not stable as against the tilting action which must take place whenever these springs are operated.

Q. 63. I show you a model. Please compare it with the "Defendant's Exhibit, Buck 1871 Patent," and state whether or not it correctly represents the construction shown in that patent.

(The question and all reference to the patent in relation to the alleged model is objected to for the reason that the model is not identified nor its connection with this case explained to the witness or included in the question, and for the further reason that it is irrelevant and secondary.)

A. This model does correctly represent a truck as shown in the Buck patent.

Q. 64. In the lower left-hand drawing on "Complainants' Exhibit, Enlarged Buck Patent Drawing" has been objected to by defendant's counsel "in respect of the proportion of the semi-elliptic springs there illustrated." In view of this objection, please state whether or not if you took out the semi-elliptic spring shown in that lower left-hand drawing (being a side elevation of the Buck truck) and substituted therefor a spring of the like proportionate strength as shown in the semi-elliptic spring in the lower right-hand drawing of the semi-elliptic, this substituted spring would afford resilient support for the car body.

(The question is objected to on the ground that it is incompetent, irrelevant and secondary.)

A. It would not. The inventor states that the transverse spring, which is the one shown in the lower left-hand corner of this drawing, is to act as a spring only upon extraordinary occasions. If the longitudinal springs, being the one shown on the lower left-hand corner of this drawing, were made approximately as strong as the transverse spring shown in the lower right-hand corner of the drawing, there would be no spring action in the truck whatever, except upon extraordinary occasions.

Q. 65. I show you "Defendant's Exhibit, Peckham 1891 Patent," and "Defendant's Exhibit, Peckham 1896 Patent." Please look at the motor supports shown in Fig. 3 of the former patent and in Fig. 4 of the latter patent, and state whether or not during your employment at the Peckham Works, motor supports of these constructions were manufactured and out on car trucks or sold?

(The question is objected to on the ground that the Peckham Motor Truck and Wheel Company or the Peckham Manufacturing Company are not parties to this action, and upon the further ground that the witness has not qualified as an expert in patent matters and has not stated that he is familiar with the specifications and drawings of patents; and for the further reason that the question is immaterial, incompetent, speculative and secondary.)

A. During the time that I was in the employ of the Peckham Motor Truck and Wheel Company, and the Peckham Manufacturing Company, no motor suspensions of this form shown in the aforesaid patents were manufactured.

Recess.

Q. 66. Please examine the motor-supporting devices shown respectively in Fig. 3 of the Peckham patent 464,253, dated December 1, 1891, and in Fig. 4 of the Peckham patent, No. 563,685, July 7, 1896, and state whether or not, as there constructed and assembled, either the bolt *j* of Peckham patent 464,253, or the bolt 29 of Peckham patent 563,685, can have a pivotal movement on their respective supports. Give your reasons for any opinion which you may express.

(The question is objected to as being manifestly improper, the witness not having qualified as an expert with regard to the specification and drawings of letters patent; and for the further reason that it is speculative, incompetent and not proper rebuttal testimony.)

493 A. In these patents the bolts *j* and 29 are used in connection with a flexible or spring support to the motors. In supporting a motor on a bar, as shown at F and 28 in these patents, where there is a spring to resist both the upward and downward pull of the motor, as shown by the springs 30, 30-A and the cushions T, the bolts *j* and 29, which pass through these springs or cushions, are screwed up so as to put the springs under heavy compression, so that the motor by its action in lifting up or pulling



down cannot compress either the upper or lower spring sufficiently to cause the spring on the opposite side of the bar from the one which is compressed to expand sufficiently as to become loose. This tightening of the bolts *j* and 29 causes the spring 30 or the cushions *T* to press with much force against the part which carries the bolts, and this pressure produces so much friction the bolts cannot swing, but remain constantly in a vertical position.

In the Fig. 3 of patent No. 464,253 the pipe *i*, through which the bolt *j* passes, would also prevent any swinging action of this bolt.

Q. 67. I show you the following issues of the *Street Railway Journal*:

The issue for January, 1896, calling your attention to yellow advertising sheet facing page 106.

The issue of January, 1897, calling your attention to advertising sheet page 129.

The issue of October, 1897, calling your attention to advertising sheet 206.

The issue of May, 1900, calling your attention to the yellow advertising sheet 138.

I also show you the *Street Railway Review*, being the issue for Friday, October 19, 1900, with special reference to advertising page 13 thereof.

Please state whether or not you recognize these various advertising pages as being the advertisements of the Peckham Motor Truck and Wheel Company and as showing cuts with which you are familiar, of Peckham truck, with which you are also familiar.

(The question is objected to on the ground that it is immaterial, irrelevant and secondary, and for the further reason that the Peckham Motor Truck and Wheel Company are in nowise connected with the case at issue.)

A. I do recognize them as the advertisements of the Peckham Motor Truck and Wheel Company, and as showing cuts of Peckham trucks, with which I am familiar.

Q. 68. Look at the cut in the issue of January, 1897, of the *Street Railway Journal*, and give the truck designation of the truck there shown.

(The question is objected to as being manifestly incompetent, immaterial, and as calling for secondary evidence.)

A. This truck is named No. 14.

Q. 69. Give the truck designation of the pivotal truck in the January, 1896, number of the *Street Railway Journal*, being the last truck on the advertising sheet.

(Same objection.)

494. A. This truck is also named No. 14.

Q. 70. Which was the first pivotal truck put on the market by the old Peckham Company?

(Same objections, and upon the further ground that it is speculative.)

A. The No. 14 was the first pivotal truck built by the Peckham Company.

Q. 71. Which truck came next?

(Same objections.)

A. The next truck to be designed and manufactured by the Peckham Motor Truck and Wheel Company was the 14-B.

Q. 72. For what service was this designed?

(Objected to as being irrelevant, immaterial and speculative.)

A. This truck was designed especially for city cars with car bodies carried low down. It was a much shorter wheel base than the No. 14, and had the motors on the outside of the axles to especially adapt it to cars in city service.

(The *Street Railway Journals* and the *Street Railway Review* shown to the witness are offered in evidence in respect of the particular pages specified by counsel when producing them.)

(Counsel stipulates that photographic copies of these pages may be substituted on the record for the *Street Railway Journals* and *Street Railway Review*, produced by the witness with the same effect as the originals, copies to be furnished to defendant's counsel, subject to the same objections as made to the original evidence.)

Q. 73. As a practical truck man, what is the importance of easy-riding qualities in a truck, viewed from the standpoint of the electric street railway man, and as a practical question?

A. The street car operating companies desire to have their trucks easy riding for the following reasons: An easy-riding truck is supposed to, and undoubtedly does, increase the travel, especially when the company would be competing with other companies whose trucks were not as easy riding. Easy-riding springs cause less jar and shaking of the truck frames, so that they are not as rapidly shaken to pieces, bolts do not as often come loose and the pounding of the track at rail joints is less, so that the track would be more durable.

Q. 74. What is the life of an electric street railway track, as compared with a steam railway track, and on which is the most wear and tear?

(The question is objected to on the ground that the witness has not shown that he is competent to testify regarding steam railroad tracks nor the relative wearing qualities of such tracks in connection with electric railway tracks; and further, that the question is at best purely speculative.)

A. The average life of a street railway track in this country is much less than that of a steam railway track.

Q. 75. Can you give the reason for this statement?

(Same objection.)

495 A. One reason why street railway tracks have shorter lives than steam railway tracks is the fact that the use of the

street railway tracks in cities by wagons causes a much increased wear of the rails.

Q. 76. As between a Peckham 14-B-3 truck or a Brill 27-G, on the one hand, and a truck of the Maximum traction type on the other hand, with which can you use the narrowest car bodies, and why?

A. The narrowest car bodies can be used with a Maximum traction truck, as constructed by the Brill Company. The reason for this is the center of swing or pivotal point of the Maximum traction truck being close to the axle which carries the large wheels; in rounding curves these wheels do not approach the car sills as closely as the wheels in the 14-B-3 truck, which has the pivotal point located much farther from the axles. For this reason, when the Maximum traction truck is used, the sills of the car body can be located a less distance apart, or nearer together, which is desirable in the narrow streets of most of the cities, because it makes a narrower car body.

(Complainants' counsel offers in evidence the model of the Buck truck produced today, and testified to by the witness, and it is marked "Complainants' Exhibit, Model Buck Truck.")

(The four *Street Railway Journals* are marked respectively on the pages specifically offered:

"Complainants' Exhibit, *S. R. J.*, January, 1893."

"Complainants' Exhibit, *S. R. J.*, January, 1897."

"Complainants' Exhibit, *S. R. J.*, October, 1897."

"Complainants' Exhibit, *S. R. J.*, May 5, 1900.")

(The *Street Railway Review* is marked on the specified page "Complainants' Exhibit, *S. R. Rev.*, October, 1900.")

(Defendant's counsel objects to the following exhibit offered in evidence at this session: Complainants' alleged model Buck truck, designated "Complainants' Model of Buck Truck," on the ground that said model is obviously not built in accordance with the drawings and specifications of "Complainants' Exhibit. Buck 1871 Patent." The admission of the alleged model is further objected to on the ground that the workman or model maker employed in the construction of the alleged model has not been here produced to identify the same, or to testify that the same is built in accordance with the specifications and drawings of said letters patent.)

Cross-examination.

By WARFIELD & DUELL:

X Q. 77. Mr. Price, in your direct examination, you referred to the Curtis truck. Will you please describe briefly the construction of said truck?

A. The first design of the Curtis truck was for single-truck cars, that is, a car body was carried on one truck only. The journal boxes were supported in yokes or pedestals, the journal box supporting springs being located on each side of the journal boxes and inside of the pedestal. Pivoted to the top of the pedestal castings in a jaw were equalizer bars, which extended longi-

tudinally of the car and carried springs on which rested the car body. These equalizer bars were connected together on each side of the car at their ends at the center of the side of the car in such a way that the inventor claimed and supposed that the oscillation of the car body when traveling over an uneven track, which usually takes place in single-truck cars, would be prevented. It was thought that when one end of the car was depressed that the action would pass through from one equalizer bar to the other and cause the other end of the car to be equally depressed, so that there would be no galloping action of the car.

This first truck was not a pivotal bearing truck; it was a long wheel base.

X Q. 78. Explain the difference in the spring systems, if any, between the Peckham No. 16 or "Jersey Special" and Peckham 14-B-3 truck.

A. There is no difference in the design of the spring systems of these two trucks.

X Q. 79. I show you "Defendant's Exhibit, Overbagh 1870 Patent." If it were designed to allow the bolts A to swing longitudinally and transversely of the truck, what expedient would be adopted by a mechanic to give said bolts such movements?

(Objected to as indefinite, unless it is stated that such change was to be made with or without a change in the organization of the truck as shown and described in the patent.)

A. In order to permit of the bolts A, as shown connected to the equalizer bars D, to swing transversely and longitudinally it would be necessary to make the holes through which these bolts pass in the side frames large enough to allow the bolts the desired swing, and it would be necessary to connect the lower ends of the bolts to the equalizer bars by a double jaw or shackle.

X Q. 80. Then in your opinion, it would be within the skill of a mechanic skilled in the art to provide such a construction to allow this longitudinal and lateral swing of the bolts A?

(Same objection, and as irrelevant.)

A. These changes that I have mentioned could be made, but the construction would still be inoperative, because the transverse swinging of the equalizer bar D would upset the equalizer bar springs E. It would be a fact that any equalizer bar springs E strong enough to carry the car body would prevent any swinging action taking place, so that any change in the connection between the bolts A and the equalizer bars D to permit of a swinging movement of these bolts would be inoperative for either a transverse or longitudinal direction of swing.

X Q. 81. Please answer yes or no, whether or not it would be an ordinary mechanical expedient, that in case it was desired to give a bolt or bar extending through an opening a wobble or a transverse or lateral swing to make such opening of larger diameter than the exterior diameter of the bolt or bar.

497 (At this point Mr. Rawle remarked casually, aloud, "You are not bound to answer the question yes or no;" and the witness remarked, "I do not see how I can answer it yes or no.")  
(Same objection as before.)

A. The question I cannot answer by yes or no, as the conditions of both connections at the top and bottom are not given by the question.

X. Q. 82. Please explain what effect the top and bottom connections of the bolt would have on said bolts swinging or wobbling transversely or longitudinally of an opening or hole.

(Same objection, and further, does defendant's counsel refer to the bolts as employed in the Overbagh truck, or does he refer to bolts employed generally and disassociated from that truck? A hypothetical question should be made more specific and definite.)

(Defendant's counsel replies that while, in his opinion, the question is perfectly clear and capable of understanding, he will again reiterate the same for the benefit of the witness and complainants' counsel.)

X Q. 83. In your opinion, would it be within the skill of a mechanic that in case it was desired to allow a bolt a wobble or a lateral or transverse swing, while extending through an opening in a beam, to provide an opening of a larger diameter than the diameter of said bolt?

(Objected to as irrelevant.)

A. It would be practicable to provide for such a wobble of the bolt, provided it had nothing connected to the top or bottom ends of the bolt to prevent such wobbling action.

X Q. 84. Would a bolt having positioned between the end thereof and said beam (assuming that the opening in said beam was sufficient to allow a lateral or transverse swing) an encircling spring, such as shown in "Defendant's Exhibit, Overbagh 1870 Patent," disregarding any connections at the bottom end thereof, be permitted a wobble, or, in other words, a lateral or transverse swing?

(Same objection of irrelevancy. The particular point made by this objection is that it is not relevant to the issues involved in this case what changes or modifications could be made in the structure of the Overbagh patent.)

A. It would swing provided a force was applied to the lower end to cause it to swing, said force being connected by a double jaw, which would permit of swing in two directions.

X Q. 85. I hand you "Defendant's Exhibit; Buck 1871 Patent." Assuming that a bolt arranged in the manner specified in the question 84 had connected thereto a loop, such as shown at *r*, and through said loop there was loosely inserted a shackle, such as shown at *p*, in turn connected to support a bolster free to move laterally and longitudinally, would such a transverse and longitudinal movement be permitted?

(Same objection of irrelevancy, and further that the question is

so involved and so clearly hypothetical, embracing as it does elements taken from several patents, that in the absence of a drawing or model clearly illustrating just exactly what is comprehended by the question, complainants' counsel refuse to be bound by any answer, that witness may give.)

498 A. The drawings and specifications of this Buck 1871 patent show that the supporting links *r* are forced with great pressure against the bottom of the cross ties D, which produces great friction between those parts, so that no swinging of the links *r* could take place. The springs O P are rigidly connected to the bolster so that no swinging of the shackles P can take place, as these are rigidly connected to the ends of the springs O P, as neither the links *r* nor the shackles *p* can have any swinging movement, the bolster as shown in this patent cannot swing in a transverse direction.

X Q. 86. I call your attention to "Complainants' Exhibit, Model Buck Truck," alleged to be a model of the construction set forth in Buck patent of 1871. Does the bolster so connected have a transverse swing?

(Complainants' counsel objects to the question as indefinite in the use of the words "so connected." What does defendant's counsel mean by those words in that question?)

A. The bolster does not have a transverse swing without an undue amount of force being applied to it. The necessity for such a large amount of force being applied in order to produce the swing would render the construction impracticable for the purpose of a swing bolster.

X Q. 87. Please answer yes or no whether the bolster in complainants' alleged model, designated "Complainants' Model of Buck Truck," have a lateral swing.

(Witness is instructed that he is under no obligation to answer the question yes or no.)

(Defendant's counsel in reply states that this so-called model of truck built, it is said, in accordance with specifications and drawings of the Buck patent has been merely produced with absolutely no evidence to prove other than the statement of counsel and the testimony of this witness that it was built in accordance with the drawings and specifications of said letters patent.)

(It is further stated that the evidence regarding the construction of this model in accordance with the specifications and drawing of the Buck patent is believed to be incompetent and insufficient.)

A. I cannot answer this question by yes or no for the reasons that the conditions given in the question are insufficient.

X Q. 88. What conditions in the above question are referred to?

A. I refer to a lack of conditions.

X Q. 89. How does the witness reconcile his last answer with his preceding one.

A. The conditions are insufficient; there are not enough conditions given.

X Q. 90. Is any lateral swing permitted of the bolster in "Com-



plainants' Exhibit, Buck Truck," upon the application of force, directed transversely of the truck frame to the bolster, as said model stands before the witness, upon the table?

A. Owing to looseness of the parts, when force is applied to the bolster in a transverse direction only, there is a slight transverse movement of the bolster, but when there is also a heavy downward pressure applied to the bolster, which would be the condition when it would be placed under a car body, there is practically no transverse swing, until a very heavy transverse force is applied to the bolster, so as to overcome the friction between the links *r* and the cross ties *D* as shown in the Buck patent.

I have recently, or during the past year, been making some very careful tests of the amount of force or friction required in city and interurban double truck bolsters to entirely prevent such swing taking place under ordinary running conditions, and I find it to be in city trucks only about what a strong man can exert by pushing and pulling with his right arm; in heavier interurban cars a little more force is required to prevent the swing of the bolster. The friction between the links *r* and the cross ties *D*, as shown in the Buck patent, would be far greater than what would be necessary to prevent the swinging of the bolster.

X Q. 91. Then under certain conditions, the bolster, alleged to be built in accordance with the specifications and claims of the Buck 1871 patent, has a transverse movement; is that correct?

A. As I have stated in a previous answer, owing to the friction between the link *r* and the cross tie *D*, there would be no swing of the bolster, under ordinary conditions of load, and when the springs *Q R* were deflected under extraordinary occasions, as stated in the specifications of the Buck patent, the tilting or rolling of the car body to one side would still force one of the links *r* against the cross ties *D* with sufficient force to give sufficient friction to prevent any swinging of the bolster.

X Q. 92. Assuming that springs *Q* and *R* of said Buck patent were maintained out of engagement with the cross bar, would then the bolster be permitted a lateral swing by reason of the link connection?

A. Under these conditions the bolster would be free to swing transversely, but this is a condition which can never occur in this truck.

X Q. 93. Please state your reasons why the condition referred to in the preceding question could never occur.

A. This condition could never occur, for the reason that always either one or both of the links *r* would be pressing with heavy force against the cross ties *D*.

X Q. 94. Then if both ends of the springs referred to were out of engagement with said cross bars, assuming that such a condition could exist, a lateral or transverse swing of the bolster in the truck frame would be permitted?

A. It could.

X Q. 95. How much space is needed longitudinally of the truck in which to accommodate a motor?

A. That space varies with different sizes of motors; from about 26 to 32 inches.

X Q. 96. Have you read the Overbagh patent?

A. Yes, I have read it.

X Q. 97. When did you first read it?

A. In the year 1896, in the Patent Office, Washington,

D. C.

500. X Q. 98. Do you remember reading it at that time?

A. Yes, I remember reading it at that time.

X Q. 99. Mr. Price, when did you leave the employ of the Peckham Company?

A. It was about the first of March, 1903.

X Q. 100. At that time did you have or had you any trouble with Mr. Peckham, the head of the company?

A. I had had no unusual trouble with Mr. Peckham at that time, except a difference of opinion as to agreement in regards to salary, and difficulty in obtaining salary due me. At that time, as well as during the most of the time I was in the employ of the Peckham Company, I, as well as other employees of the Peckham Company, had to endure from Mr. Peckham, at least once a week, most unjust and outrageous abuse, which I would not have withstood as long as I did, if I had not been financially interested in one article that he was manufacturing, which was a momentum friction brake for street cars, called the "Price Friction Brake." This fact of outrageous abuse on the part of Mr. Peckham is known among all people who know Mr. Peckham.

X Q. 101. Then, in view of what you have stated, you are somewhat hostile to the Peckham Manufacturing Company, are you not?

A. I am not acquainted with the people whom I believe now own and control the Peckham Manufacturing Company, and I certainly have no spirit of hostility toward them.

X Q. 102. Did you, while working for the Peckham Manufacturing Company and under the direction of Mr. Edgar Peckham, make application for letters patent, and subsequent to your leaving the employ of said company assign the same to John A. Brill, or the Brill Company?

(Complainants' counsel objects to the question for the following reasons: An interference proceeding is now pending in the United States Patent Office between an application filed by the witness for a patent for an improvement in ear trucks, which application was prepared, filed and prosecuted by the firm of Duell, Megrath & Warfield. Some time thereafter a Chinese copy of the Price application, prepared by the same attorneys, was filed in the United States Patent Office as part of an application for the identical invention, made in the name of Edgar Peckham. No assignment from Price to anyone had been prepared and none was executed, with respect to the said Price application. An interference to determine the question of priority of invention was declared in the Patent Office, between the said applications and at said Peckham's request. An officer or employee of the Peckham Manufacturing Company, alone testified in behalf of Peckham. His testimony was to the same effect as is embodied, exclusive of the question of the assignment to Brill, as is now contained in the question put to the witness. This testi-



mony has been held on appeal to be insufficient to support Peckham's claim to priority of invention, and the sole object of the present question is merely to seek testimony from this witness, which  
501 either may be used against him, in the above interference proceeding or in a proceeding which may be instituted against his assignees in the event that the interference finally goes against Peckham, seeking to recover the patent which has been already granted to the witness.)

(The question is also objected to on the ground that it is no proper part of the direct examination of the witness, and that it is entirely irrelevant to any issue herein. Complainants' counsel therefore advises the witness that if he deems that any part or the whole of any answer he may give to the above question may be used against him, that he may, for the above reasons, properly refuse to answer the question in whole or in part; but he is left to his own election.)

(Defendant's counsel states that the above question was not put to the witness with the idea of obtaining from him any evidence which could be used in the interference proceedings referred to by complainants' counsel, as such interference proceedings is now before the Commissioner of Patents on appeal, awaiting determination; all the evidence or testimony relating thereto having been taken. The question simply put to show the hostility of the witness toward the Peckham interests by his applying for letters patent when in their employ and under the direction of the officers of said company, and subsequently assigning it to a rival company after the termination of his employment by said company.)

(Complainants' counsel objects to the statement of defendant's counsel as not being in accordance with the facts. If all the defendant wants to know is whether a certain patent taken out in the name of this witness was assigned to one John A. Brill, complainants have no objection to witness answering to that effect.)

(Defendant's counsel state that such admission will be satisfactory if it is admitted that the application referred to was filed while the witness was in the employ of the Peckham Company.)

(Complainants' counsel states that he does remember, and it is a fact, that the firm of Duell, Megrath & Warfield, the predecessors of the present firm, constituting defendant counsel and solicitors, sent a bill to the witness for services rendered him personally in preparing and filing the application of the patent above mentioned.)

(Defendant's counsel states that such an application was prepared and filed by the firm of Duell, Megrath & Warfield while this witness was in the employ of the Peckham Company.)

(To which complainants' counsel replies that that statement is not proof of the fact asserted, and asks that the examination proceed along proper lines.)

A. In view of the statement of the complainants' counsel, I decline to answer the question, except to say that I did not apply for a patent with the knowledge or under the direction of Mr. Peckham, and afterward assign the same to John A. Brill.

X Q. 103. Did you voluntarily leave the employment of the Peckham Company, or were you dismissed from their employ?

502 A. I was not dismissed from the employ of the Peckham Manufacturing Company, but refused to work under the conditions which they imposed. The facts in regard to my leaving the Peckham Manufacturing Company, I believe, are only accurately known to Mr. Peckham and myself, as no one else was present during the interview which led to my leaving the company.

X Q. 104. You being a practical truck man, and interested in the art to which trucks belong, did you at once, upon leaving the employment of the Peckham Company, enter into the employ of another truck company?

A. I did not.

X Q. 105. What was the nature of your employment in the position which you secured subsequent to leaving the Peckham Company?

A. I was out of employment for two months, and then accepted a position of engineer and assayer with the Fentress Gold and Copper Mining Company, of Greensboro, N. C.

X Q. 103. How long a time elapsed between your leaving the Peckham Company and your entering the employment of another company interested more or less in the subject of electrical propulsion?

A. About seven months after I left the employ of the Peckham Company I did some designing of trucks for the Standard Steel Car Company, of Pittsburg, Pa., some of my time being given to them, and some of my time being devoted to work for other persons. About eighteen months after I left the employ of the Peckham Manufacturing Company I was offered and accepted a position of manager of the Electric Car Truck Department of the Standard Steel Car Company.

X Q. 107. Then while working for the Fentress Gold and Copper Mining Company you were on the lookout for another position with a truck company, were you not?

A. I was not.

X Q. 108. Did you not, as a matter of fact, leave the employ of the Fentress Company to accept a position in a company interested in railway rolling stock, cars, etc.?

A. I did not.

Deposition closed.

WILLIAM G. PRICE.

Sworn to and subscribed before me this sixth day of July, 1905.  
SAMUEL BELL, *Examiner.*

Counsel stipulate that at tomorrow's session, July 7th, complainant's counsel will examine their expert witness, Joseph P. Livermore, and that such examination may proceed in chief, from day to day, in the absence of defendant's counsel, until the said witness's examination in chief shall have been completed, and thereupon defendant's counsel will, if they choose, attend and proceed immediately to cross-examine the witness at the close of the examination in chief; the right being reserved to defendant's counsel if  
503 they shall not have attended said examination to place upon

the record their objections to the evidence of Joseph P. Livermore, in chief.

Adjourned to meet at this place tomorrow, July 7, 1905, at 10:30 A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, July 7, 1905.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Joseph L. Levy, Esq., for Complainants.

JOSEPH P. LIVERMORE, being recalled upon behalf of the complainants, testified as follows:

By Mr. LEVY:

Q. 1. What is your name, and have you testified before in this case?

A. Joseph P. Livermore. I have.

Q. 2. Have you read the testimony on behalf of the defendant in this case, and have you specially considered the testimony of Joseph H. Freeman, defendant's expert, and have examined the various exhibits referred to in said testimony?

A. I have.

Q. 3. Please compare the constructions shown and described in the various letters patent, publications and models in regard to which Mr. Freeman testified, with the trucks of the Brill patents in suit, and state whether or not, in your opinion, they or any of them embody or disclose the constructions respectively shown and described in the Brill patents in suit, and referred to in the claims in issue in this case. Give your reasons for any opinion you may express, and make any comment that you may see fit upon any testimony given by Mr. Freeman relating to any matter as to which you may testify.

A. Before making the detailed comparison of the several prior structures referred to in the testimony of Mr. Freeman, with the construction forming the subject of the Brill patents sued upon, I will state that, in my opinion, none of said prior structures embodies the combinations shown and described in said Brill patents and referred to in claims here sued upon, and that the said Brill truck differs substantially from all of the structures of the prior art and is a substantial improvement thereon. It is only by regarding as immaterial differences in construction and arrangement which he recognizes as existing that Mr. Freeman finds in many of the prior structures an anticipation of the construction forming the subject of the Brill patents, and he also takes the ground, as I understand his testimony, that by taking certain elements from some prior structures and substituting them for certain of the elements of the other prior structures, a structure would be produced essentially the same as the structure forming the subject of the Brill patents. Mr. Freeman's view, as I understand it, with reference to these constructions, which would have been produced if the substitutions referred to by him had been made, is

that it is obvious that if for any reason it had been desired to do so, it would be within the knowledge and skill of an ordinary mechanic to make the substitution suggested by him and thus produce a structure substantially similar to that forming the subject of the Brill patents.

It is evident, however, that it never occurred to any mechanic or truck maker to desire to make the substitutions suggested by Mr. Freeman prior to the time of the Brill patents sued upon, and it seems to me that Mr. Freeman, while recognizing the ease with which the desired combination might be constructed when its desirability had been recognized and pointed out, has overlooked the fact that there is nothing in the prior structures to indicate or suggest to a skilled mechanic or constructor that any advantageous results would accrue from making the substitutions suggested, and while it *now* seems obvious that the Brill truck *might* have been produced at an earlier date from the materials known in the art, it was not until Brill discovered the advantages arising from the new combination of elements that said combination was actually produced, or it was not until the said combination had been discovered and produced by Brill that its manifest advantages over prior constructions and arrangements were made evident and available for use in railway traffic.

Briefly summarized, the features of construction and arrangement that essentially characterize the Brill truck are the truck frame supported upon the wheel journals, having side frames outside of the wheels and above the wheel axles; the transverse bolster between the two pairs of wheels having free vertical movement and lateral and longitudinal play in the truck frame; the semi-elliptic springs, one at each end of the bolster, lying at the outside of the wheels beneath the side frames of the truck frame and the spring links suspending the ends of the semi-elliptics from the side frames and having universal movement to accommodate the swing of the bolster and the spread of the semi-elliptics incident to their spring action.

The foregoing elements make a unitary structure or structural combination, every feature of construction and arrangement of which is essential for the proper coaction of all the parts to attain the results that the truck is intended to produce.

By this construction and arrangement the springs of the system, and especially the semi-elliptic springs, combined with the spiral springs of the spring links by which the semi-elliptics are suspended from the side frame, not only contribute to the easy riding of the car body by absorbing the shocks that would otherwise be transmitted from the wheels of the car body, but they serve very efficiently to relieve the truck structure of internal strains that are incident to various of the constructions of the prior art, and by their conjoint action accomplish more than the sum of their individual actions or effects, which might be obtained if the same elements were incorporated in other arrangements in a truck structure.

505 Mr. Freeman's view that certain other radically different constructions or organizations are essentially the same as that of the truck shown and described in the Brill patents here sued upon,

and that the location of the spring connections between the bolster and the truck frame relatively to the other parts of the truck is immaterial, so far as the subject matter of the claims in issue in this case is concerned, is an indication that if he had only the knowledge and material derivable from the prior art considered by him, he would not have discovered or devised the combination characteristic of the Brill truck, and apparently he would not have recognized that any improvement over the prior art structures was desirable or attainable.

Mr. Freeman in the course of his discussion pointed out that the general purpose of the prior art structures was the same as that of the structure forming the subject of the Brill patents here sued upon, and was effected in general by the same means, the purpose, broadly considered, being to render the car easy riding, and this being accomplished by the use of springs of various kinds, such as elliptic springs or half-elliptic springs, spiral springs and rubber springs or cushions interposed at various points between the wheel journals or axle boxes and the car body or truck bolster upon which the car body directly rests.

It is, of course, true that the general purpose of many, if not all of these structures, is to render the car easy riding, and that this, in general, is accomplished by the use of springs of various constructions, and the conditions are such that it is difficult to recognize and point out any essential differences in mode of operation of individual elements or of the combination of elements in the various structures, since under many conditions of use the differences are not apparent or important, while under other conditions, which are liable to occur more or less frequently in the regular service of the trucks, the differences may be of great importance. It is the fact, however, that many varieties of truck structures have been devised to meet the requirements of electric railway traffic, and that a considerable number of these have been tried in actual service, and that, while all that have been so tried are operative in the sense that they will support and carry the car and in a greater or less measure relieve it from the shocks incident to the travel of the wheels upon the track, many of these structures have been discarded or their use discontinued, but so far as my own observation and information extend, trucks having the characteristics of construction and arrangement of the truck shown and described in the Brill patents here sued upon have come into very extensive use and have largely supplanted the various prior trucks employed for electric street railway service.

In comparing the Brill truck with the several prior art structures which are regarded by Mr. Freeman as embodying essentially the same combination and anticipating the said Brill truck, I shall endeavor to point out the more important features wherein the elements of the Brill differ in function and mode of operation from the elements of the prior structures regarded by Mr. Freeman as corresponding thereto, but I shall not attempt to explain in detail or to account for the advantages of the Brill truck in case of riding, durability, exemption from derailment and the like, under all of the various conditions incident to traffic, such



as differences in speed, differences in quality of the roadbed, grades, curves, switches and the like.

### Recess.

Mr. Freeman, after explaining the general construction and arrangement of the truck of the Brill patents sued upon, calls attention to the paragraph, beginning line 119, page 2, of the first Brill patent (No. 627,898), which points out that the location of the points of support of the bolster and its spring system on the side frames outside of the wheel gauge and near the axle boxes, is better than the usual location of such supports from the cross members or transoms of the truck frame within the wheel gauge, and states that these general features of construction are embraced in an application filed by Brill and Curwen, and therefore are not claimed in the said Brill patents sued upon.

This statement evidently referred to the location of the points of support of the bolster, and not to the specific character of the bolster support, which is substantially different from that of the truck forming the subject of the Brill patents here sued upon.

As pointed out by Mr. Freeman, the application of Brill and Curwen, referred to in the patents sued upon, resulted in the grant of two patents, Nos. 610,118 and 610,119, both of which show essentially the same construction, so far as it has any bearing on the subject matter of the Brill patents here sued upon, and I will, therefore, consider only patent No. 610,118, it being understood that my views with reference to the relation of the construction therein shown to the construction shown in the Brill patents here sued upon apply equally to patent No. 610,119.

Referring to the drawing of the Brill and Curwen patent, No. 610,118, the truck comprises a main truck frame, having side frames 6, substantially like the truck frame of the Brill patents in suit. From these side frames near the ends thereof are suspended spring links pivoted to swing transversely of the truck, and supporting at their lower end a longitudinal rigid equalizing bar 27. Upon this equalizing bar, or rather, upon the two equalizing bars at the two sides of the truck, is supported a spring plank 38, containing the wood filling marked 40 in Fig. 1, upon which are supported elliptic springs 45, arranged transversely of the truck, and sustaining upon them the car bolster 50.

To make the analogy or correspondence between this truck of the Brill and Curwen patent, and that of the Brill patents in suit as close as possible, the parts I have just referred to as the spring plank, elliptic springs and bolster, may be regarded as a two-part bolster having the springs incorporated in it between the parts. This two part spring-containing bolster is supported at its end upon rigid equalizing bars, which in turn are hung by transversely swinging spring links from the side frames of the main truck frame. Even if it be assumed that this Brill and Curwen truck performed all of the functions that are performed by the truck of the Brill patents in suit,

507 and no more and no less, then it is obvious that by the combinations which characterize the truck of the Brill patents in suit, Brill, the inventor or producer of the said truck, has been able to make a single element, to wit, the longitudinally disposed semi-elliptical springs perform the work of three distinct parts or elements in the Brill and Curwen truck, namely, the rigid equalizing bars, the spring plank, or lower section of the bolster, and the full elliptic spring interposed between the spring plank and the bolster. This certainly is an important advance in the art, and it seems to me clear beyond question that a combination wherein four elements combine to perform all the work that has previously required six elements for its performance is a substantially novel combination, and indicates coactive relationship and co-operation of the elements of which it is composed, rather than a mere assemblage or aggregation of functions which previously had required several additional elements in order to secure their performance.

It is obvious upon inspection that in the Brill construction the single element, the semi-elliptic springs, performs the functions of two separate elements in the Brill and Curwen structure, namely, of the rigid equalizer bars and the full-elliptic springs, and also enables the bolster to be made as a single structural part instead of requiring two parts, namely, the bolster and sand plank.

It does more than this, however, for in the Brill and Curwen construction the sand plank, with the rigid equalizer bars secured to the ends thereof, is a substantially rigid frame supported at the four points by the links from the truck frame. Any unequal division or distribution of the pressure upon these four points of support, such as arises when one of the wheels meets an unevenness or obstruction in the truck, tends to produce internal torsional strain in this component of the truck frame composed of the sand plank and rigid equalizer bars, while in the construction forming the subject of the Brill patents sued upon such an excess of pressure at one of the four points of support of the bolster from the truck frame would be received by the yielding semi-elliptic spring, the spring action of which would relieve this portion of the structure of severe torsional strain. In other words, the semi-elliptic springs of the truck of the Brill patents here sued upon, by their co-operative relationship to the remaining elements of the truck, not only perform the functions of the rigid equalizer bars of the Brill and Curwen construction and of the elliptic springs of that construction in relieving the car body of shocks, but also perform an additional and new function of relieving the truck structure itself of internal strains, which result is not attained in the construction shown in the Brill and Curwen patent.

Mr. Freeman, after referring to the difference in construction between the truck of the Brill and Curwen patent and that of the Brill patents here sued upon, says:

"It thus appears that the subject matter of claims 13 and 81 of a patent in suit No. 627,898, consists in the providing between a truck bolster and a truck frame of a particular spring connection."

508 He then refers to the British patent to Spencer and Stidolph as showing a semi-elliptic spring and a movable and resilient connection therefor in the form of a link and a rub-

ber spring or cushion interposed between the links and the rigid frame piece or bracket with which it is connected.

This British patent does not show a truck, and contains no suggestion whatever of a truck structure having the components and relations which characterize the truck of the Brill patents sued upon. It is merely directed to the application of a "pad or pads of india rubber or other suitable elastic material at the two ends of the laminated steel bearing springs of carriages, trucks or locomotive engines used on railways, tramways and common roads to absorb the shocks which the bearing springs sustain from the road or wheels not being true in line or form."

The patent to Graham, No. 503,044, is also referred to in this connection as showing a semi-elliptic car spring connected at its ends with links with which are combined spiral springs, which afford a further spring support for car bodies or truck frames, this arrangement corresponding more nearly to the axle box springs in the pivotal trucks under consideration in this case than to anything else pertaining to the construction of said pivotal trucks.

Obviously neither the Spencer and Stidolph British patent nor the Graham patent affords any disclosure or suggestion whatever of the combination of elements making up the truck structure shown and described in the Brill patent sued upon, and referred to in the claims in issue in this case, and they show nothing more than that certain of the elements of the said Brill structure were old when considered individually and without reference to their structural and operative relations to the remaining elements of the combinations claimed.

Mr. Freeman said, with reference to these constructions, that:

"Anyone at all familiar with mechanical matters will at once perceive that if semi-elliptic springs and resilient connections for the ends thereof can be used as shown in the patents to Spencer and Stidolph and Graham, they could also be used in the manner shown in the patent in suit."

That statement is probably true, if anyone had knowledge of all of these structures, but it seems to me to presuppose or assume the knowledge or existence of the Brill structure, which was not had at the time of the Spencer and Stidolph patent or of the Graham patent, and there is, so far as I can see, nothing in either of these patents which would lead to or suggest in any way the production of the structure forming the subject of the Brill patents sued upon.

The first patent referred to by Mr. Freeman, as in his opinion substantially embodying the subject matter of the first Brill patent is the patent to Buck, No. 112,897, which Mr. Freeman says:

"shows a swing bolster, pivotal car truck having substantially the same elements arranged in substantially the same operative relationship as the construction shown and described and specified in claims 13 and 81 of the first Brill patent."

509

I totally disagree with the above quoted statement and, on the contrary, regard it as obvious that in the truck shown in the Buck patent the elements are not the same, and are not arranged



in the same operative relationship to one another as in the construction shown and described in the first Brill patent, and referred to in claims 13 and 81 thereof.

In the truck of the Buck patent there is a truck frame and a bolster, and the bolster is supported upon semi-elliptic springs near its ends, arranged lengthwise of the truck, but said semi-elliptic springs are not suspended resiliently or otherwise from the side frames of the truck, but are hung by shackles from the ends of other semi-elliptic springs, arranged transversely to the truck, and themselves supported at the middle of their length upon hangers depending from transverse beams forming a part of the truck frame and arranged about midway between the bolster and the extreme ends of the truck frame.

The semi-elliptic springs upon which the bolster rests are shown in the Buck patent as located in the same plane as the wheels, and therefore occupy the space between the two wheels at each side of the truck. This necessitates the spacing of the two pairs of wheels at a distance apart sufficient to accommodate the entire length of the semi-elliptic springs, and any spreading or longitudinal movement which they may have between the peripheries of the two wheels either side of the truck, thus making a truck with a very long wheel base, which was one of the objects aimed at by Buck and regarded as desirable by him in the service for which his truck was devised.

The conditions of street railway service are such, however, as to preclude the use of trucks with a long wheel base, and it is one of the advantages of the construction forming the subject of the Brill patent sued upon that the truck may be made with a comparatively short wheel base without sacrifice of stability and reliability in service.

It is to be borne in mind that in the Brill truck the points of support of the bolster, which sustains the car body, on the truck frame are wide apart, being upon the side frames outside of the wheel gauge and near the axle boxes. Thus the *spring* base is relatively large, while the *wheel* base of the truck is relatively small, giving great stability together with easy spring action without excessive swaying or lurching of the car body and without a jerky motion. It is inherent in the nature of the construction shown in the Buck patent, on the other hand, that a shortening of the wheel base or placing of the axles nearer together can only be attained at the sacrifice of stability and elasticity in the spring supports, as the placing of the wheels nearer together necessarily involves a corresponding contraction of the spring base and shortening of the springs, which renders them stiffer and harsher in action.

Adjourned to meet at the same place, Saturday, July 8, 1905, at 10.30 A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, July 8, 1905.

110

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Francis Rawle, Esq., for Complainants.

Mr. LIVERMORE, the witness, continues his answer to question 3:

Referring more specifically to the construction shown and described in the Buck patent, the semi-elliptic springs O P that support the bolsters are hung by shackles to the ends of the stiff transverse semi-elliptic springs Q R, which are pivotally hung at T in the hanger straps U at the middle of the width of the truck.

The transverse springs Q R are shown as bearing at their ends against the bottom surface of the transverse beams D D of the truck frame, and so long as they remain in this condition the said transverse springs are immovable and have no elastic action. The patentee states that he prefers "to make the springs Q R of sufficient power to hold up their ends on ordinary occasions in contact with the lower side of the intermediate cross ties; but having sufficient flexibility to be brought into use as springs on any extraordinary occasions." It will be recognized that so long as the ends of the springs Q R remain in contact with the cross beams D D, they have no spring action, and the operative effect is precisely the same as if the upper members of the shackles were connected directly to the cross beams of the truck frame instead of to the ends of the stiff transverse spring. In other words, according to what the patentee describes as his preferred construction "on ordinary occasions" (whatever that may mean), the bolster supporting semi-elliptic springs are not resiliently supported from the truck frame at all.

If, on the other hand, the springs Q R do flex or come into spring action, as is contemplated by the patentee "on any extraordinary occasions," the entire bolster and car body thereon becomes supported upon the longitudinal pivotal axis at T below the center of gravity, and are thus in a state of unstable equilibrium, and will at once lurch toward one side or the other until the ends of the springs Q R at the opposite side bring up against the bottoms of the cross beams D D. Under such conditions the bolster supporting semi-elliptic spring at one side of the truck is non-resiliently supported, while that at the other side is resiliently supported, but the car body is unstable and liable to lurch from side to side wholly unrestrained until one or the other end of the transverse spring Q R brings up with a bump against the transverse beam of the truck frame.

It will be understood, furthermore, that if the transverse springs are made light enough to act as springs all the time, that is, on ordinary as well as extraordinary occasions, the conditions last described will prevail all the time, that is, the car will be unstably supported and liable to lurch violently from side to side, and both semi-elliptics supporting the bolster will be resiliently supported only during the actual lurching movement of the car body, at the end of which one or the other of the semi-elliptics will cease

to be resiliently supported, its shackles being held against the non-yielding cross beams of the truck frame.

Whenever the transverse springs of the Buck truck are in action at all as springs, the car body will be in an unstable condition, similar to that of an ordinary four-legged table with one leg not reaching the floor, and the discomfort and danger of such a support for the car body will be recognized by anyone experienced in railway travel.

Generally speaking, the transverse stability of the car will be greater the greater the width of the spring base, and in the Brill truck the width of the spring base is the full width of the truck frame, that is, the distance between the side frames which are outside of the wheel gauge.

In the Buck truck the width of the spring base (assuming that the bolster supporting semi-elliptics constitute the spring base) can be increased only by lengthening the transverse springs Q R, but this would not increase the stability if the said springs Q R acted as springs, for in that case the support would be transmitted to the axis at T lengthwise below the middle of the truck and affording no stability at all, the bolster being a veritable teeter board. Furthermore, such widening of the spring base would preclude any shortening of the wheel base, except by corresponding shortening and stiffening of the bolster-supporting springs as the transverse supporting springs would stand across the periphery of the wheels.

In the Buck construction the wheel base can be shortened without shortening the bolster supporting semi-elliptics only by bringing the latter within the wheel gauge or so that they lie between the wheels at the two sides of the truck instead of outside of the wheels as in the Brill truck. In other words, in the Buck construction, the wheel base can be reduced only at the sacrifice of spring action in the semi-elliptics or at the sacrifice of width of spring base.

In short, while a Buck truck is probably operative to the extent that it would support a car body and enable it to be trundled along the track, it seems to me obvious that it would be absolutely worthless for modern electric traction traffic; and that it utterly fails to meet the requirements of street railway traffic, and is totally devoid of the characteristics of construction that are shown and described in the first Brill patent, and are referred to in claims 13 and 81 thereof.

Mr. Freeman, referring to the transverse springs Q R of the Buck truck and the shackles depending from the ends thereof, which support the bolster supporting semi-elliptics, says:

"These links and springs of the Buck construction correspond exactly, in operative relationship and in function or result, with the spring links and movable and resilient connections or links, combined with springs of the Brill construction."

512 The analysis above given by me of the Buck construction shows that nothing could be much further from the truth than the above statement.

In the Brill construction the spring links at all times afford a resilient support for the bolster supporting semi-elliptic springs.

In the Buck construction the transverse springs and links never afford a resilient support for the semi-elliptic springs, except while

the car body is in actual movement of teetering or lurching from one side to the other on the longitudinal pivotal axis of support below the middle of the truck. Buck points out as his preferred construction that the transverse springs and shackles do not afford a resilient support "on ordinary occasions"; and on extraordinary occasions they can afford a resilient support for only one of the bolster-supporting semi-elliptics at a time, except during the actual lurching movement to which the car body is subjected.

In the Brill construction the spring links support the semi-elliptics from the side frames of the trucks, and thus afford a maximum width of spring base and maximum transverse stability in the support of the car body with an easy spring action, entirely eliminating any unrestrained side lurching of the car body. In the Buck construction, with the transverse springs Q R not acting, the semi-elliptics are non-resiliently supported at the ends of said springs and in effect from the cross beams D D, with the width of the spring base as shown in the patent considerably less than the width between the side frames; while if the transverse springs Q R are acting, the support from the truck frame is practically at the point T, and no transverse stability whatever is afforded until one or the other end of the transverse spring ceases to act by bringing up against the cross beams D D, and thus arresting with a jerk the, up to that time, unrestrained side-lurching movement of the car body.

Mr. Freeman says that he observes the difference between the points of support from the truck frame in the Buck and Brill structures, but says:

"This difference, however, is entirely immaterial so far as the subject matter of the claims are concerned."

As the subject matter of said claims is the Brill truck shown and described in the specification of the patent, and as the resilient support of the bolster-bearing semi-elliptics on the side frames is a specified feature or characteristic in the said claims, it seems to me that the differences between the Buck construction and the subject matter of said claims in the point above referred to are of the utmost materiality, since in the Buck construction the support, whatever its nature as to resiliency, is not from the side frames, and said support is, under ordinary circumstances, not resilient, and is never resilient at all four points of support (as is always the case in the Brill construction), except when the car body is actually performing an unrestrained side-lurching movement, which is highly objectionable and which never can occur in the structure of the Brill patent.

513 With reference to the fact that in the drawing of the Buck patent the bolster-supporting semi-elliptic springs are shown as located in substantial alignment with the wheel gauge, Mr.

Freeman says:

"There is no point made in the patent as to the relative location of equalizer springs. The only description as to this feature is that the springs O P are 'near the ends' of the bolster. Obviously it is within the province of the mechanic skilled in the construction of car trucks to locate these frames where, in his opinion, they will be the most effective for the purpose intended."

In connection with this statement of Mr. Freeman's it must be borne in mind that one cannot always choose what would appear to be the best location of an element of this kind in a structure of this kind if only the effectiveness of that individual element is considered, as the requirements for the other elements of the structure may preclude such location of the element in question.

From the above quoted statement and others of like purport in the testimony, and especially in Mr. Freeman's answer to redirect question 42, it appears to be Mr. Freeman's view that one of these truck structures is a mere aggregation or collection of associated parts, each of which performs only its individual function and may be arranged with reference to the performance of that function rather than that the parts must be associated to constitute a unitary structure or mechanism each elementary part of which must be brought into proper coactive relationship with all of the other parts, so that it performs its function in harmony and in coactive relationship with the other elements, the results being due to the conjoint and harmonious action of all of the parts.

Reverting to Mr. Freeman's specific statement as to the location of the bolster-bearing semi-elliptic springs, it will be seen that so far as their action in affording a vertical spring support for car bodies is concerned (which is apparently the only function he attributes to said springs in this kind of a structure), it is of but little consequence where they are located in the truck structure, so long as they come in somewhere between the journal boxes and the car body. If, however, these springs are to be located, as they are in the Brill truck, to be most effective for affording transverse stability in the support of the car body, they should be located at the extreme sides of the truck frame. In the Buck construction, however, assuming that their spring supports are active, such location would not accomplish the purpose of affording transverse stability, as is done in Brill's structure, because in the Buck structure other elements are of such character as to give the car body a side-teetering and unstable support regardless of the location of the semi-elliptics that support the bolster. Furthermore, if the skilled mechanic, building or designing the Buck truck desired to locate the wheels nearer together to shorten the wheel base, he would be precluded from locating the bolster-supporting semi-elliptics in alignment with the wheels, as shown in the Buck patent, or outside of the wheel gauge as is the case in the Brill truck, even though he  
514 thought such location would be most effective for the purpose for which the said bolster-supporting semi-elliptics are intended.

#### Recess.

In view of the obvious differences in the construction and arrangement between the Buck truck and the truck of the Brill patents here sued upon, and in view of the differences in mode of operation and results above pointed out by me, I am decidedly of opinion that the Buck patent does not disclose nor suggest in any way the combination and arrangement of parts shown and described in the



Brill patents sued upon and referred to in claims 13 and 81 of the first Brill patent.

Mr. Freeman next refers to the Davenport and Bridges patent, which he says discloses a full and complete embodiment and anticipation of the subject matter of the claims of the first Brill patent in issue in this case.

It is obvious upon inspection that the truck of the Davenport and Bridges patent, the construction of which is well shown in Figs. 1 and 2 of the drawing, is substantially different from the truck shown and described in the first Brill patent, and referred to in claims 13 and 81 thereof.

In the Davenport and Bridges construction, the bolster is supported upon longitudinal springs, which are between the wheels at the two sides of the truck or within the wheel gauge and are supported by links from longitudinal semi-elliptic springs which are supported upon the transoms or transverse members of the truck frame.

This construction affords the swinging or flexible connection between the car body and bolster and the truck frame, but does not afford the breadth of spring base and stability in the support of the car body that results from the characteristic construction forming the subject of the Brill patent, wherein the bolster-supporting semi-elliptic springs are themselves supported by spring links from the side frames of the truck outside of the wheel gauge.

I am decidedly of opinion that the Davenport and Bridges patent does not disclose nor suggest the construction of truck shown and described in the Brill patents and referred to in the claims thereof that are in issue in this case.

Mr. Freeman next refers to the Haskins patent, which is for a vehicle spring and merely shows transverse carriage body supporting semi-elliptic springs hung from side bars of the carriage frame through the intervention of spring link hangers.

The Haskins patent clearly contains no suggestion whatever of a car truck construction or of any specific way of incorporating a spring system in a car truck structure in combination with other elements of truck structure, such as the truck frame and bolster, and I do not agree with Mr. Freeman's statement that the "construction and operative relation of the connections between the vehicle and the running gear are the same in substance and effect as the corresponding parts of the construction disclosed and claimed in the patent in suit." Mr. Freeman also adds:

515 "Clearly it is a mere matter of choice or selection on the part of a mechanic skilled in the art to apply the Haskins construction to any particular form of vehicle running gear."

Accepting this statement, there is not the slightest reason to assume that if a mechanic skilled in the art desired to apply "the Haskins construction" to the running gear of a car, or to a swinging bolster truck, he would in so doing produce a truck having the characteristics of the Brill truck, or be led in any way to discover how a truck having those characteristics could be made. On the other hand, the natural way of applying the Haskins construction to

a swing bolster car truck, it seems to me, would be to employ one or more of the semi-elliptic springs arranged longitudinally under the bolster (*i. e.*, transversely relative to the truck) and connected at their ends with the side frames of the truck by the spring links, as they are in the Haskins construction connected with the side bars of the running gear of the vehicle.

It is obvious beyond any question that the Haskins patent does not show the combination and arrangement of elements that are embodied in the truck of the Brill patent, and are referred to in the claims thereof in issue in this case, and I am decidedly of opinion that the Haskins patent discloses nothing which would result in the construction of the Brill truck as the result of mere mechanical skill in incorporating the Haskins construction in or applying it to a car truck.

The above-considered patents, namely, the patent to Buck, the patent to Davenport and Bridges, the patent to Haskins, and the patent to Brill and Curwen, are the only ones which Mr. Freeman, as I understand his testimony, asserts embody the construction shown and described in the first Brill patent, and referred to in claims 13 and 81 at issue in this case.

The remaining patents were referred to by him merely as illustrating certain individual elements or features of construction entering into the Brill structure or for illustrating some statement made by Mr. Freeman in connection with his discussion of the above-mentioned patents which he regarded as anticipating the subject matter claimed in the first Brill patent or as disclosing the specific feature or improvement which differentiates the structure forming the subject of the second Brill patent from that forming the subject of the first Brill patent.

It does not seem necessary, therefore, to discuss the remaining patents at length, but I will comment briefly upon them. The patents to Peckham, No. 424,723, No. 464,253 and 563,685, were cited in connection with the first Brill patent merely as showing that spring links were old for supporting something with a spring action in a vertical direction. In these constructions the spring support is for the end of the motor frame, the other end of which is journaled upon the wheel axle, and the effect of the spring in the supporting link or connection is to admit of a slight yielding movement of the end of the motor frame up or down, thus cushioning or relieving the torsional strain due to the driving action of the motor, especially when first starting into operation.

516 The patent to Overbagh, No. 104,876, was also cited as showing a spring link which is supported upon the side frame of the truck and itself supports one end of an equalizer bar, the other end of which is supported upon the end of the journal box. The equalizer bar itself supports the truck frame through the intervention of springs shown as rubber springs.

The patent to Beach, No. 173,257, also shows a spring link which is employed to support a truck bolster from a truck frame, a pair of such spring links, one at each side of the truck, constituting the sole spring system between the bolster and truck frame. The

spring links in the Beach construction perform about the same function as a bolster support, that the spring links shown in the Peckham patents above referred to perform as a motor support and illustrate such changes in construction as might be found necessary or desirable in employing a spring link for one or the other of these uses:

It is obvious that none of the above-mentioned patents referred to as showing the spring links contain any suggestion whatever of the combination of elements entering into the truck shown and described in the first Brill patent, but at most they show only that one element of that truck structure, considered without reference to its specific construction and relation to the remaining elements, was old.

The patent to Block, No. 416,555, was referred to merely as illustrating that certain devices are applicable to both in the construction of car trucks and in the running gear of ordinary road vehicles as a warrant for regarding the construction shown in the Haskins patent as pertinent to the subject matter involved in the present case.

The patent to Longstreth, No. 249,962, and that to Hefferman were merely mentioned incidentally in connection with the Buck patent as showing semi-elliptic springs placed below the side frames of a truck. In these patents the running gear of a locomotive is shown and the semi-elliptic springs support the main side frame of the locomotive and are themselves supported from the axle boxes. Functionally they correspond to the axle box springs which support the truck frame, if they correspond to anything in a pivotal truck, and clearly these patents disclose nothing with reference to the construction of a pivotal swing bolster truck.

The patent to Cooke, No. 595,045, was referred to in connection with the second Brill patent as showing a jointed or articulated link similar to that which forms an element of the truck forming the subject of the second Brill patent. The truck shown in the Cooke patent is substantially the same as that shown in the Brill and Curwen patent before considered by me, and comprises a spring plank which supports the bolster through the intervention of elliptic springs and is itself supported by rigid equalizing bars, one at each end, which are supported by spring links from the side frame of the truck.

Adjourned to meet at the same place on Monday, July 10, 1905, at 10.30 A. M.

517 POST OFFICE BUILDING, PHILADELPHIA, *July 10, 1905.*

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Francis Rawle, Esq., for Complainants; Warfield & Duell, for Defendant.

The witness, Mr. LIVERMORE, continues his answer to question 3:

The remaining patents referred to by Mr. Freeman, namely, patent to Thyng, No. 4276; patent to Romans, No. 34,270; patent to Adams,



No. 538,858, and patent to Baker, No. 553,298, were cited as showing trucks resembling in general organization the truck of the Brill patents here sued upon, but not containing the combination and arrangement of parts which characterize the truck of the Brill patent and are referred to in the claims at issue in this case.

The Thyng patent is one of the earliest of all of these referred to as representing the prior art, being over fifty years earlier than the time of the Brill patent sued upon. It shows a truck having a truck frame supported on the journal boxes and a transverse bolster located between transoms or cross beams at the middle of the length of the truck frame, which are suspended — the side frames outside of the wheel gauge by links or shackles, as they are called, which are shown as provided with pivotal joints, adapted for swinging transversely of the truck, but having no provision for swinging longitudinally, except possibly by a loose-jointed or ramshackle construction in the transverse pivotal joints, which are properly constructed to provide for pivotal movement in the direction transverse to the truck only. There are no springs combined with or forming a part of the shackles which support the semi-elliptic springs in the Thyng truck, which is therefore devoid of an essential element of the combination characterizing the truck of the Brill patent, namely, the spring links which resiliently suspend the semi-elliptic springs from the side frames and afford provision for swinging movement of the bolster relative to the truck frame in all directions, that is, both transversely and longitudinally and in any direction which is resultant of components in these two directions.

The difference between the combination wherein the bolster is supported from the side frame by semi-elliptic springs and spring links which afford an elastic support for said semi-elliptic springs and provision for swinging movement longitudinally and transversely as in the Brill truck, and the combination wherein the bolster is supported from the side frames by semi-elliptic springs, hung on non-elastic shackles having provision for swinging movement in the transverse direction only is, in my judgment, of great practical importance, and it may be proper for me to state in this connection that, notwithstanding

the antiquity of the disclosure of the Thyng patent, I do not  
518 recall ever having seen a truck constructed in accordance with the Thyng patent in use upon a car on steam railways or street railways, although during the last five years, more or less, I have seen a very large number of trucks embodying the characteristic combination of the Brill truck, above pointed out, in various localities on electric street railway cars.

The spring arrangement in the Brill truck is not only highly efficient in affording a spring support for the car body to relieve it from shocks and jerks and render it easy riding, but is also very efficient in relieving the truck structure itself of severe strains due both to the unevenness of road and to the transmission of power from the wheel journals and truck frames to the bolster which supports the car body.

Mr. Freeman, as I understand his testimony, regards the construction characteristic of the Brill truck as lacking in novelty, in

view of the combination shown in the Thyng truck and of the knowledge of spring links in various other combinations illustrated in the patents above considered by me, showing spring links. In connection with his consideration of the spring links of the Peckham patent, No. 563,685, used as a motor support, Mr. Freeman says:

"It is obviously within the province of the ordinary mechanic, skilled in the art of truck construction, to substitute this Peckham link for the particular form of links employed in any one of the patents above referred to for connecting the ends of semi-elliptic equalizer springs with the frame of the truck. Take, for example, the Thyng construction; the Peckham link is obviously as well adapted for supporting the opposite ends of the semi-elliptic springs of this patent as it is for supporting the motor in the Peckham patent."

There is, however, in the Peckham patent, as well as in the other patents showing spring links, nothing whatever to indicate to the assumed skilled mechanic any desirability of making the substitution referred to, or that any new or beneficial result would be obtained by the combination of spring links with the semi-elliptic springs and the truck frame and bolster as shown in the Brill patents; and an equally natural, if not the only logical substitution, if it were desired to employ spring links such as constitute the motor support in the said Peckham patent, in a truck structure like that of the Thyng patent, would be to substitute them for the nearest equivalent found for them in the old structure, namely, for the semi-elliptics and non-elastic shackles, giving a construction such as is exemplified in the Beach patent No. 173,257, above considered by me, which shows a truck similar to the Thyng truck, except that spring link hangers are employed to suspend the bolster from the truck frame in place of the spring hanger system comprising semi-elliptics and non-elastic links which characterizes the truck of the Thyng patent.

On the other hand, taking the Thyng patent as the basis, there is nothing in the construction there shown, nor in other truck constructions containing a similar spring system, comprising  
519 semi-elliptic springs and non-elastic shackles or link hangers, to indicate to the skilled mechanic any adequacy in the spring system, as such; nor to indicate how such inadequacy could be best remedied if the attempt to put the truck into practical service should show that the truck was deficient in its spring system, or otherwise.

With the solution of the problem before one, as given in the Brill patent sued upon, it appears as if such solution was attainable from the materials at hand in the prior art by bringing into combination old elements which were previously known in other combinations, but I am decidedly of opinion that in the absence of the knowledge now derivable from the Brill patents and the extensive practical use of trucks embodying the characteristic combination of the Brill truck, there was nothing in the prior art structures, individually or collectively, to lead to the discovery or production of the combination which characterizes the Brill truck.

It seems to me that this opinion is strongly confirmed by the fact that in the more than fifty years which elapsed between disclosure

afforded by the Thyng patent and the production of the Brill truck, which up to date appears to be the final solution of the truck problem, it occurred to no one to make the substitutions or changes which Mr. Freeman now asserts are obviously within the province of the ordinary mechanics skilled in the art of truck construction; and furthermore, the various trucks produced in the fifty or more years, between the time of the Thyng truck and the production of the Brill truck, and referred to in Mr. Freeman's testimony as showing generally similar organizations, do not indicate any progress or growth in the *direction* of arriving at the structure forming the subject of the Brill patent, all of the trucks in the said intervening period being, if anything, more remote from the Brill structure than the one shown in the Thyng patent over fifty years before.

The Romans patent, No. 34,270, of 1862, shows a truck wherein the bolster is supported upon semi-elliptic springs hung by non-elastic links from transverse members of the truck frame within the wheel gauge. As compared with the Thyng truck, therefore, except possibly in details of construction, of the non-elastic links, this Romans truck shows a step backward, away from the Brill truck, in not having the bolster-supporting semi-elliptics suspended from the side frames outside of the wheel gauge with the advantage of a broader and more staple spring base for the support of the bolster and car body.

The Adams patent, No. 538,858, of 1895, shows a truck having side frames somewhat similar to those of the truck frame of the Brill truck, and semi-elliptic springs supported from said side frames by non-elastic links jointed for longitudinal swinging only, to accommodate the spreading of the semi-elliptic springs when in action. This Adams truck is not, however, a pivotal swing bolster truck, but the car body is supported directly upon the semi-elliptic springs.

Obviously this Adams truck, which was a comparatively recent production in the truck-making art, and the patent for which was granted to Brill, a successful truck maker, and was presumably produced by a mechanic skilled in the art of truck construction and desirous at least of producing a good truck, if not one better than any which had preceded it, does not represent any advance or growth in the direction from the Thyng truck to the Brill truck, but indicates rather that attempts were made in other directions to produce a truck meeting the requirements of street railway traffic.

The Baker patent, No. 553,298, also a comparatively recent production, shows the bolster, or the lower member of the two-part bolster, supported at its ends upon semi-elliptic springs, which are hung from the side frames by non-elastic links, providing for swinging or pivotal movement in the longitudinal direction only. In the construction shown in the drawings transverse swing is provided for the car body by making the bolster in two parts, one of which rests upon semi-elliptic springs and has no transverse swinging movement relative to the truck frame, while the other is the direct support of the car body and is hung upon the spring-supported part by non-

elastic links jointed for movement in a direction transverse of the truck only.

Obviously the Baker truck does not indicate any step or advance in the direction towards producing the construction forming the subject of the Brill patents here sued upon, but rather like the Brill and Curwen truck, before considered by me, appears to indicate that the constructors and inventors in this art prior to the time to the Brill patents sued upon, were able to produce constructions which less fully met the requirements of a practical and efficient truck for street railway service only by the employment of other less simple combinations of the mechanical elements known in the art.

Four other patents were offered in evidence on behalf of defendant, namely, patent to Boughton, No. 472,724, and patents to Taylor, No. 455,990, No. 570,450 and No. 570,855, but they were not discussed in the testimony and it therefore seems unnecessary for me to consider them in detail. None of them shows any nearer approach to the subject matter of the Brill patent here sued upon than the patents above described by me.

Recess.

With reference to the second Brill patent, it is to be borne in mind that while the construction therein shown is distinguished from that forming the subject of the first Brill patent, only by difference in details of construction of the spring links, the said second patent is based upon a divisional application of that forming the subject of the first patent, and is, according to my understanding, for one of the specific forms of the invention forming the subject of the first patent, rather than to be regarded as for an improvement upon the construction forming the subject of the first patent.

All of the claims in issue in the second patent include in the combinations referred to the components and structural relations heretofore pointed out by me as essentially characterizing the truck of the Brill patents, and the truck of the second Brill patent is differentiated from all of the prior art structures by the same essential characteristics as have before been pointed out by me as distinguishing the Brill truck from the trucks of the prior art.

Mr. Freeman in discussing the second Brill patent refers to the patent to Cooke (which, as I have before pointed out, shows a truck of the same type and general construction as that forming the subject of the Brill and Curwen patent) as showing link hangers having a joint similar to the joint which distinguishes the links of the second Brill patent from the links of the first Brill patent. In the Cooke patent the non-elastic links for supporting the rigid equalizing bars are jointed for transverse swinging movement only, being practically the same as the link hangers or shackles shown in the Thyng patent in the construction of their joints.

Referring to the Cooke patent, Mr. Freeman makes the following statements:

"It is obvious that anyone having the slightest knowledge of mechanical matters and a sufficient knowledge of the practical art to supply the right proportions and strength of parts, could substitute

semi-elliptic equalizer bars for the rigid equalizer bars of the Cooke construction, and that in making such substitution, it would at once be known that suitable provision should be made in the connections between the links and the track frame to allow for the slight end play of the spring equalizers, as well as for the limited end play of the transverse bolster."

He made a similar statement with reference to the construction shown in the Brill and Curwen patent, saying:

\* \* \* "It is obvious that, if desired, the equalizer bars could be connected directly with the bolster and, where elastic equalizer bars are employed, they might take the place of the springs arranged between the lower member 38, or 'sand plank,' as it is termed, forming part of the spring bolster construction shown in the Brill and Curwen patents."

With the knowledge derived from the Brill patents here sued upon, and from the extensive introduction of trucks embodying the construction shown in said patent, it is *now* obvious that a highly efficient truck can be produced by a structure similar to that of the Cooke, and Brill and Curwen patents, except that in place of the rigid equalizer bars, sand plank and elliptic springs supporting the bolster, semi-elliptic springs or elastic equalizer bars, as Mr. Freeman calls them, are employed.

The Cooke, and Brill and Curwen patents, however, seem to me to show conclusively that what Mr. Freeman *now* points out as an obvious fact was not known to, or recognized or discovered by, the inventors of the structures forming the subject of these patents at the time when the structures forming the subject of said patents were invented by them, as it is inconceivable that they should have adopted the more complicated and cumbersome construction shown in said Cooke, and Brill and Curwen patent, if it were recognized that all of the results and advantages accruing from said construction, and more, could be attained by the simpler construction forming the subject of the Brill patents here sued upon, by a combination involving a less number of elements to perform all of the functions and some additional ones, as was pointed out by me when I first considered the truck of the Brill and Curwen patents in the early part of my answer to the third question.

For the foregoing reasons, I am of the opinion that the truck shown and described in the Brill patent here sued upon and referred to in the claims thereof, in issue in this case, is substantially different from each and all of the structures of the prior art, and is not anticipated or foreshadowed in any way in the prior art structures.

Q. 4. You testified in your examination in support of the plaintiff's *prima facie* case that you found in the defendant's truck structure the subject matter of certain claims of the two patents here sued upon. State whether or not you have, in view of the testimony of defendant's witness, Mr. Freeman, changed the opinion expressed by you at that time.

A. I have not. As I understand Mr. Freeman's testimony on this point in answer to question 6, he does not question the fact that defendant's truck embodies the same structural combination as that



which forms the subject of the Brill patents here sued upon, as explained by me in my former deposition in this case.

His view appears to be that defendant's truck embodies the construction forming the subject matter of the claims in issue in this case, unless said claims are limited to substantial identity in construction of each individual element of the combination, and more especially of the spring links, with the construction specifically shown in the drawing of the Brill patent sued upon.

As pointed out in my preceding answer, there is nothing in the prior art to limit the Brill construction for its novelty to the specific details of individual elements shown in the drawings of the patent, the Brill truck being differentiated from the prior structures by the novel combination of elements or components entering into its construction rather than by any novelty in the specific construction of the elements, or of any one of them, considered merely as an individual mechanical device and apart from its structural and operative relations to the remaining elements with which it is associated in making up the whole structure.

(Complainants' counsel offer in evidence a certified copy from the records of the Patent Office of the file wrapper and contents in the matter of the letters patent granted to Charles F. Uebelacker, assignor to the Peckham Motor Truck and Wheel Company, October 31, 1899, No. 635,986, for improvement in car trucks, and the same is marked "Complainants' Exhibit, File Wrapper of Uebelacker Patent 635,986.")

(Counsel for defendant objects to the offer of the file wrapper and contents U. S. Letters Patent to Charles F. Uebelacker, No. 635,986, on the ground that it is irrelevant and immaterial.)

Q. 5. I refer to the certified copy of the file wrapper and contents of U. S. Letters Patent to Charles F. Uebelacker, No. 635,986, granted October 31, 1899, to the Peckham Motor Truck and Wheel Company, assignee of Charles F. Uebelacker, in accordance with which the defendant's trucks were manufactured, as admitted in paragraph 18 of the answer filed in this cause.

I find in said file wrapper, on page 9, among the original claims, the following:

"7. In a car truck, the combination with the side frames each comprising two pedestals, an upper longitudinal beam and a lower longitudinal beam of a car body supporting bolsters, half-elliptic springs, upon which the ends of said bolster rest, and links suspended from between the upper longitudinal beams and supporting the ends of said springs for the purpose of permitting lateral displacements of said springs with relation the side frames."

I also find in Patent Office letter in this file wrapper, dated November 26, 1897, the following words:

"Claim 7 is rejected on a document on file in the Patent Office, entitled 'Fifteen Months of Experience with a Perfect Passenger Truck,' published by J. G. Brill Company, Philadelphia, Pa., received by the office January 22, 1897, in view of patent No. 4276, Thyng, November 18, 1845. (Trucks, four wheels, bogies.)"

In response to this letter from the Patent Office, the attorney for the applicant, in a letter dated December 7, 1897, wrote the office, in connection with the rejection of original claim 7, the following:

"This special combination is not shown by Tyng (Thyng) or by Brill. Applicant's construction, with the pedestals, duplex upper beams, and the links between the members of the upper beams, springs and lower beams is new, and it is thought patentable."

In a subsequent letter of applicant's attorney, dated February 2, 1898, is the following:

"Insert the following claims:

"12. In a car truck, the combination with the side frames, each comprising two pedestals and upper and lower beams, of a car body supporting bolster, a plurality of half-elliptic springs arranged between the upper and lower longitudinal beams of the frames and connected to the ends of the bolster, link appliances connected to the ends of said half-elliptic springs, and flexibly supported at their upper ends on said upper beams.

"Change former claim 13 (original 15) to 13 and 13, 14 to 14, 15.

"Insert:

"16. The combination in a car truck of the side frames comprising pedestals, upper and lower side beams connecting the pedestals, axle boxes in the pedestals, a bolster, half-elliptic springs which support the bolster, links and springs supports therefor supported from the upper beams and supporting the half-elliptic springs between the upper and lower beams.

"17. The combination in a car truck of side frames each comprising upper and lower longitudinal beam and pedestals, half-elliptic springs arranged between the upper and lower beams, a bolster supported thereby, the ends of the half-elliptic springs being supported from the upper beams by spring-equipped appliances.

"18. The combination in a car truck of the side frames each comprising upper and lower beams and pedestals, of half-elliptic springs arranged beneath the upper side beams, a bolster supported by said half-elliptic springs and appliances connected to the ends of the half-elliptic springs and supporting them from the side frames, and spiral springs coacting with said appliances by which the half-elliptic springs are suspended."

In the letter from the Patent Office, following this amendment, and dated February 9, 1898, is the following:

"Claim 12 is rejected on the patent to Thyng, of record, in view of No. 538,858, Adams, May 7, 1895 (Trucks, Electric Motors, Bogies), the latter patent being cited to show the specific form of truck and the semi-elliptic spring mounting.

"Claims 16, 17 and 18 are rejected on the above-noted patent to Thyng in view of the truck shown and described in the document on file in the Patent Office, received January 2, 1897, entitled 'A Perfect Passenger Truck,' published by the J. G. Brill Company, of Philadelphia, Pa."

The attorney replied to this in part as follows on February 25, 1898:

"Claim 12, line 6, insert before 'link' the word 'and,' and in line 7 erase the comma after 'spring.'

"The Thyng patent cited for this claim is not an answer, particularly because the links which support the ends of the half-elliptic springs are not *flexibly supported* at their upper ends on the upper beams of the truck frame. Besides the Thyng truck frame does not comprise upper and lower longitudinal beams connecting pedestals together. The feature of flexibly supporting the suspended links at their upper ends on the upper beams of the truck frame clearly differentiates this claim from the Thyng patent. \* \* \*

"Claim 16, line 4, erase 'which support' and substitute '*arranged between the upper and lower side beams and supporting*'; and in line 5, change 'supported' to read 'suspended.'

"This claim is not met by Thyng of record, since the Thyng patent does not show lower side beams connecting the pedestals, and particularly does not show *spring supports* suspending the links which support the ends of the elliptic springs—from the upper beams. This is an important feature in the applicant's organization."

"The Brill circular 'A Perfect Passenger Truck' does not show a truck embodying the combination of claim 16, since in the Brill truck there are no half-elliptic springs arranged between the upper and lower longitudinal beams of the side frames, the said half-elliptic springs supported at their ends by link appliances flexibly suspended from the upper side beams. Brill's truck embodies a spring plank arranged transversely of the truck, supporting full elliptic springs which in turn support the bolster, the said spring plank being itself supported on equalizing bars suspended by spring appliances from the upper side beams of the truck. This is distinctively a different organization from that of the applicant."

"For the reasons above given, applicant's claim 17 is also clearly distinguished from the two references cited."

"Applicant's claim 18, for the reasons above stated, is also clearly distinguished from the Thyng and Brill citations."

The Brill circulars above referred to, "A Perfect Passenger Truck" and "Fifteen Months of Experience with a Perfect Passenger Truck," are in evidence here and describe a truck made in accordance with the Brill and Curwen patents, Nos. 610,118 and 610,119, being marked respectively "Brill First Circular No. 27 Truck" and "Brill Second Circular No. 27 Truck."

Please state whether or not the structural features referred to in the foregoing by the attorney for Uebelacker as differentiating the truck of the Uebelacker patent (defendant's truck) from the Thyng patent and the Brill and Curwen patent, are embodied in the truck of the Brill patent in suit No. 627,898, and equally differentiate it from said references.

A. Substantially the same structural features are embodied in the truck of the Brill patent 627,898, as were referred to by Uebelacker's attorney as being embodied in Uebelacker's truck, and as differentiating it from the prior structures shown in the Thyng patent and in the Brill and Curwen patents. These features of the Brill truck, namely, the flexible support for the upper ends of the link appliances



on the upper beams of the truck side frame, and the spring supports for suspending the links which support the ends of the semi-elliptic springs from the upper side beam, also differentiate the said Brill truck from the prior Thyng truck and from the prior Brill and Curwen truck in precisely the same structural and operative characteristics as were referred to by Uebelacker's attorney as distinguishing the Uebelacker truck from said Thyng and Brill and Curwen trucks.

Briefly stated, the action of the Patent Office examiner in rejecting claims 16, 17 and 18 on the patent to Thyng, in view of the Brill and Curwen truck, appears to have been based upon the same ground as one of those taken by Mr. Freeman as a foundation for his conclusion that the broader combinations referred to in the claims of the Brill patent in issue in this case are devoid of substantial novelty, or should be regarded as the product merely of mechanical skill as distinguished from the exercise of the inventive faculty. Uebelacker's attorney pointed out briefly that such grounds were untenable and the Patent Office accepted this view. I am of the opinion  
526 that Uebelacker's attorney was right in the view that the truck of the Thyng patent and the truck of the Brill-Curwen patent are substantially different organizations from the truck of the Uebelacker patent (and consequently from the truck of the Brill patent in suit) and it is my opinion that the points of distinction briefly referred to by Uebelacker's attorney are substantial differences, and are or involve substantially the difference which were explained by me more fully in my last answer as substantially differentiating the truck of the Brill patent here sued upon from the truck of the Thyng patent and from the truck of the Brill and Curwen patent, and in fact from all of the structures disclosed in the patents and publications in evidence in this case, showing the state of the art to which the truck of the Brill patents in suit pertains.

(Counsel for defendant, under stipulation, now objects to that part of the witness's testimony as usurps the function of the court by giving his opinion as to the validity of the patents in suit.)

#### Cross-examination.

By WARFIELD & DUELL, without waiver of objections:

X Q. 6. I ask you to consider patents to Brill Nos. 627,898 and 627,900, these patents being the ones involved in this suit, and particularly claims 13 and 81 of the former, and claims 13, 14, 15 and 17 of the latter. Do you find in any of said claims a statement referring specifically to a longitudinal movement or swing of the semi-elliptic springs?

A. No. I do not find that the longitudinal movement of the links is specifically mentioned in any of the said claims.

X Q. 7. Referring again to patent numbered 627,398 and 627,900, and to the claims mentioned in question 6, do you find any statement in any of said claims referring specifically to a short wheel base truck?

A. I do not.

X Q. 8. Have you ever, in referring to the Thyng patent, No. 4276, dated November 18, 1845, used the following language or language to this effect:

"The first is the Thyng patent, No. 4276, dated November 18, 1845. My comparison of the structure shown in this patent with the Brill truck has before been fully given. It does not disclose a car truck embodying the combination of a truck frame having side frames, a bolster, longitudinally arranged, semi-elliptic springs supporting the ends of the bolster, and elastic links or elastic extensible suspensions of any kind connecting the ends of the semi-elliptic springs with the side frames. It does, however, embody a combination including all of the above-named elements, except the elastic and extensible links, and it has non-elastic links jointed for transverse swinging to connect the ends of the semi-elliptic springs with the side frames."

527 A. I have. The above quoted statement was made by me in my deposition in the North Jersey case, which has been referred to several times in the present case.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 9. You say you used those words in answer to a question during your examination on the North Jersey case. Please state whether or not in answer to the same question in that case you used the following words:

"This feature of universal pivoting or provision for free swinging of the links longitudinally as well as transversely of the truck is not disclosed in the Thyng patent, in which the links or shackles, as they are called, are provided with pivot joints adapted for swinging transversely, but do not provide for swinging movement in the direct or longitudinal of the truck, except possibly by a loose-jointed or ramshackle construction in the joints, which are properly constructed for pivotal movement only in the direction transverse to the truck."

A. I did.

Deposition closed.

JOSEPH P. LIVERMORE.

Sworn and subscribed to before me this tenth day of July, 1905.  
SAMUEL BELL, *Examiner*.

Adjourned to meet Tuesday, same place, at 11.15 A. M., July 10, 1905.

POST OFFICE BUILDING,  
PHILADELPHIA, July 11, 1905.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Francis Rawle, Esq., for Complainants; Warfield & Duell, for Defendant.

SAMUEL T. BOLE, a witness previously sworn in the case, called on behalf of the complainants, testified as follows:

I have been previously sworn in this case.

Q. 1. What position did you hold in the Brill Works in 1895 and 1896?

A. Superintendent of Machine and Truck Department.

528 Q. 2. State whether or not you had anything to do with building some trucks for the Mill Valley and Tamalpais Scenic Railway Company, and if so, when.

A. I both superintended the machining of the different parts and the assembling of same, and personally inspected the trucks after their completion. This was in the early spring of 1896.

Q. 3. Were all these trucks assembled in your department and to your personal knowledge?

A. They were.

Q. 4. State whether or not you saw them knocked down for shipment and shipped.

A. I did.

Q. 5. At what stages of the work did you inspect them?

A. At all stages.

Q. 6. Did you report on them to your superior officer?

A. Not to any superior officer.

Q. 7. State whether or not it is a part of your business to inspect and pass upon completed trucks before shipment.

A. It is one of my special duties.

Q. 8. To whom were these trucks shipped?

A. To Mill Valley and Mount Tamalpais Scenic Railway Company. I do not know the state of their destination.

Q. 9. I show you "Complainants' Exhibit, Photograph of Mt. Tamalpais Truck." Please state if you recognize this and what it is.

A. I recognize the photograph as one taken of the trucks referred to in my testimony.

Q. 10. Does it correctly represent one of those Mt. Tamalpais trucks as you saw them just prior to their shipment?

A. It does.

Q. 11. I show you:

"Complainants' Exhibit, Blue Print, January 24, 1893."

"Complainants' Exhibit, Blue Print, March 16, 1896."

"Complainants' Exhibit, Blue Print, March 19, 1893."

"Complainants' Exhibit, Blue Print, May 25, 1896."

"Complainants' Exhibit, Blue Print, January 14, 1895."

Please state whether or not you recognize these blue print drawings, and if so, state what they are.

(The question is objected to for the reason that the witness has

not qualified as to his knowledge of the prints in question. Further objection is taken to the photographs and prints for the reason that they are irrelevant and not material to any issue in this case.)

A. I do. They are blue prints of the details furnished my department for preparing and assembling of the trucks referred to.

Q. 12. State whether or not you mean that these are the working drawings which you used in building the Mt. Tamalpais trucks.

(Objection is taken for the reason that the witness has already answered the question, and further because it is leading.)

529 A. I mean that they are the working drawings furnished me and which I used for the machining and building of the trucks referred to.

Cross-examination.

By WARFIELD & DUELL, without waiver of objections:

X Q. 13. You say you superintended the machining and assembling of the trucks shipped to the Mill Valley and Mt. Tamalpais Scenic Railway Company, and saw them built for shipment?

A. I did.

X Q. 14. Do your duties as superintendent of the Machine and Truck Department connect you with the Shipping Department?

A. My inspection of the trucks connects me with the Shipping Department.

X Q. 15. To what place were the trucks in question shipped?

A. To the Mill Valley and Mt. Tamalpais Scenic Railway Company.

X Q. 16. Where is such company located?

A. I do not know.

X Q. 17. Then you cannot state positively that such trucks were correctly marked for shipment, can you?

A. No.

X Q. 18. Have you positive knowledge that "Complainants' Exhibit, Photograph of Mt. Tamalpais Truck" is a photograph of one of the trucks shipped to said company?

A. I recognize the photograph as being one of the Mill Valley and Mt. Tamalpais Scenic Railway trucks.

X Q. 19. What distinguishing features of this photograph lead you — make this identification?

A. The motor suspension in particular, as well as the general construction of the truck.

X Q. 20. What truck is represented in the photograph in question?

A. It is a Brill 27-B truck.

X Q. 21. Did the trucks shipped to the Mill Valley and Mt. Tamalpais Scenic Railway Company differ from the other 27-B trucks?

A. This particular truck differs in the motor suspension.

X Q. 22. Do you ever remember shipping trucks having this motor suspension to any other company?

A. I do not recollect.

X Q. 23. Then, as far as your recollection is concerned, trucks

having this identical motor suspension might have been shipped to other companies?

A. I have no recollection of any being shipped.

Deposition closed.

SAMUEL T. BOLE.

Sworn to and subscribed before me this 11th day of July, 1905.

SAMUEL BELL, *Examiner*.

530 WILLIAM PHILLIPPI, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

Q. 1. What is your occupation?

A. Photographer.

Q. 2. Have you done photograph work for the Brill Company?

A. Yes, sir; I have been doing their work for about twenty-five years.

Q. 3. I show you "Complainants' Exhibit, Photograph of Mt. Tamalpais Truck." State whether or not you recognize this photograph, and, if so, state what it is.

(The question is objected to on the ground that the photograph referred to is irrelevant and immaterial to any issue in this case.)

A. This photograph I made in 1896; it is a truck of the J. G. Brill Company.

Q. 4. Where did you take it?

A. At the works of the J. G. Brill Company.

Q. 5. State whether or not you personally took this photograph.

Deposition closed.

W. PHILLIPPI.

Sworn to and subscribed before me this 11th day of July, 1905.

SAMUEL BELL, *Examiner*.

JOHN T. DUNLAP, a witness called on behalf of the complainants, having been duly sworn, testified as follows:

Q. 1. What is your age, residence and occupation?

A. Age 35 years; residence, 3726 Walnut Street; occupation, clerk.

Q. 2. How long have you been employed as such by the J. G. Brill Company?

A. Since January, 1889.

Q. 3. Have you charge of their sales book?

A. Yes, sir.

Q. 4. Have you produced the sales book of the J. G. Brill Company covering the years of 1896 and 1897.

A. Yes, sir; 1896 and part of 1897, to July 1st.

Q. 5. Can you find therein an entry of trucks sold and shipped to the Mill Valley and Mt. Tamalpais Scenic Railway Company?

(The question is objected to on the ground that whether or not trucks were shipped to the Mill Valley and Mt. Tamalpais Company

is irrelevant and immaterial to any issue in this case, and for the further reason that it involves secondary evidence.)

A. In the Brill Sales Book No. 7, page 147, I find the following entry:

"March 28, 1896, Mill Valley and Mt. Tamalpais Scenic Railway, Mill Valley, Marin Co., Cal.  
"6 Patd. Pivotal Trucks, No. 27-B. 250, 1500."

531 Q. 6. State whether or not this entry is in your handwriting.

A. The entry is in my handwriting.

Q. 7. State whether or not you had charge at that time of this Brill sales book and the duty of making entries therein.

A. I did.

Q. 8. What is the nature of this sales book and at what time relatively to a transaction are entries made therein?

A. The book is a book of original entry of all sales of materials of every description, either manufactured by the Brill Company or bought outside and sold by them. The entries in almost every instance are made on the day after the date thereof.

Q. 9. What stage of the transaction do the entries represent—the beginning or the end, or what?

A. They represent the actual sale of finished material actually shipped, or in shipping condition.

Q. 10. If goods are shipped on say the first of the month, on what day do you make entries in this book?

A. On the second of the month, except where it should fall on Sunday.

Q. 11. Do you find in this book a shipment of trucks to the Consolidated Traction Company, Jersey City?

(Objected to as irrelevant and immaterial, and secondary, the books themselves being the best evidence.)

A. On page 474 of the same book I find an entry under date of March 13, 1897, as follows:

"Consolidated Traction Co., J. C.

"2 Patd. Pivotal Trucks, No. 27-D.

400.00."

Q. 12. What does J. C. stand for?

A. Jersey City, N. J.

Q. 13. What is the order number of this order?

A. 7621½.

Q. 14. I forgot to ask you the order number of the Mt. Tamalpais trucks; please give that.

A. 7047.

Q. 15. On page 479 of the same book I find an entry as follows:

"Consolidated Traction Co., J. C.

"6 Patd. Pivotal Trucks, No. 27-D, @

200."

State whether or not this is the same order for trucks as the last shipment to the same company?

A. It is.

Q. 16. What is the order number?

A. 7621½.

Q. 17. State whether or not you find a shipment of one of the trucks of this order to Niagara.

(Objected to as being immaterial, irrelevant and secondary.)

A. I do not find any such shipment of that order.

532 Q. 18. State whether or not you find an entry of shipment of a truck to Niagara during that year.

(Same objection.)

A. I find an entry in our memorandum book, page 127, under date of October 11, 1897, as follows:

"Ship'd to J. G. B. Co. for American St. Ry. Convention, Niagara Falls.

"1 No. 27-D truck. Order 7846½."

Q. 19. What was this transaction and what was this truck?

A. This truck was sent there for exhibition purposes, at the American Street Railway Convention at Niagara Falls.

Q. 20. What became of it, so far as your books show?

(Objected to as irrelevant, immaterial and secondary.)

A. The books show it was returned to us at the close of the convention.

I find opposite the same entry which I have just read the following: "O. K. Retd."

Q. 21. Turn to your sales book and state what became of this truck after its return?

A. This sales book ends June 30, 1897.

Q. 22. What ultimately became of this exposition truck?

(Same objection.)

A. It was shipped to the Consolidated Traction Company at Newark, N. J.

Q. 23. What is the nature of the entries in the memorandum book produced by you, as showing the shipment of the 27-D truck to the Niagara-Falls Exposition?

A. It is a book for entries similar to that mentioned, that is, wherein there is no charge to be made for the material actually shipped, and is kept for the purpose of having a record of various materials.

Q. 24. Shipped under what general class of circumstances?

A. Entries are made in this book for shipments of various kinds; in some cases for materials shipped to replace incorrect materials, and in other instances for materials shipped free of any charge to the consignee.

Q. 25. Materials shipped to whom, that is, under what circumstances?

A. Materials shipped to companies or parties without charge and for the purpose of having a record as to the disposition of various materials.



(The foregoing deposition is objected to as being irrelevant and immaterial to any issue in this case, all reference to the books and the entries therein is objected to on the ground that it is secondary evidence.)..

Cross-examination.

By WARFIELD & DUELL, without waiver of objections:

X Q. 26. From what do you make the entries in the book above referred to in your deposition?

533 A. From reports handed to me by the men who load the material for shipment.

X Q. 27. Then you have no personal knowledge, except as derived from such reports of the actual shipping of the materials?

A. Yes, I have, in that I obtain a bill of lading for every shipment.

X Q. 28. From what other source of information do you derive your knowledge as to the actual shipment of material?

A. From no other source.

X Q. 29. Except from the reports and bills of lading, you have no personal knowledge as to the actual shipment of the materials, have you?

A. No.

Redirect examination.

By Mr. RAWLE:

R. D. Q. 30. When do you get these reports of shipment?

(Objected to as being indefinite.)

A. They are handed to me on the morning following the day of shipment.

JNO. T. DUNLAP.

Sworn to and subscribed before me this 11th day of July, 1905.

SAMUEL BELL,  
Examiner.

Recess.

WALTER S. ADAMS, recalled and his examination in chief continued.

By Mr. RAWLE:

Q. 16. Give lengths of car bodies between posts for double-truck cars, such as you mount upon 27-G trucks.

A. The lengths over corner posts is about 28 feet to 36 feet.

Q. 17. Give the weight of such car bodies.

A. The weights of the cars bodies when they are complete with the equipment ready to run will be from 14,000 to 24,000 pounds.

Q. 18. What is substantially the approximate number of passenger such cars will carry?

(Objected to as irrelevant and immaterial.)



A. These cars carry at different times as many as 150 passengers.

Q. 19. State whether or not the strength of the spring system is made to meet these conditions of weight of car and load.

A. They are, and with the addition of about 40 per cent. to take care of the blows that are imposed upon them due to the inequalities of the track.

Q. 20. You have previously testified as to the number of 27-B, C, D and G trucks sold by the Brill Company. Please bring the figures down to date.

534 A. Up to and including July 5, 1905, over 8400 of these trucks were sold.

Q. 21. How have the sales of these types compared in the aggregate in the last three or four years with the sales of the Brill Maximum traction truck?

A. There has been a greater sale of the 27-G than the Maximum traction.

Q. 22. For how many years has this been true?

A. This has been true for about four or five years.

Q. 23. Is the ratio growing in favor of the 27-G sales or otherwise?

A. The ratio of the 27-G compared with the Maximum traction is increasing.

Q. 24. State whether or not you know of any instance of the breakage of the ball or top part of the suspension link in a Brill 27-G truck, where it rests against the top of the side frames.

(Objected to as immaterial and irrelevant.)

A. I understand you to refer to what is termed the equalizing spring bolt, which has a half-ball head. I know of one instance where the head of this bolt was broken, but do not know the cause of breakage.

Q. 25. State whether or not such breakage was reported to the Brill Company for replacement of the broken part.

A. It was.

Q. 26. State whether or not that is the only such instance you have known of.

A. It is.

Q. 27. State whether or not if others had been reported they would, in the ordinary course of business, have been brought to your attention.

(Objected to as being indefinite as to the words "ordinary course of business.")

A. They would have been.

Q. 28. Please state the names of the predecessors in business of the defendant company.

A. The Metropolitan Railway Company was one; the Washington Traction and Electric Company was another.

Q. 29. State, if you know, how many truck orders the Brill Company had from the Consolidated Traction Company of New Jersey in 1897.

(Objected to as being immaterial and irrelevant, it not appearing that the truck mentioned had anything to do with this case.)

(Complainants' counsel states that he wishes to show to this witness the truck order numbers on the trucks sold to that company in order to complete the evidence given by the witness Dunlap. Also that this evidence is to be followed by other evidence of another witness, which will connect those orders for trucks with the real defendant in this case.)

A. There were two orders; I have in mind the Brill order numbers for them were 7621½ and 7846½.

Q. 30. How many trucks in the two orders, and what truck number did you use to fill the order?

535 A. My recollection is that there were 50 trucks in the first order and 40 trucks in the second order. They were the 27-D type truck.

Q. 31. I hand you a blue print, do you know what this is?

A. This blue print is a facsimile of one that was used to obtain the order 7621½.

(The above answer is objected to on the ground that the blue print referred to is secondary evidence and complainants' counsel is requested to produce the original drawing from which the blue print was made.)

Q. 32. State whether or not you had anything to do with making the original drawing of this blue print.

A. This drawing was made under my instruction.

Q. 33. On what date?

A. In January, 1897.

(The blue print is offered in evidence, and is marked "Complainants' Exhibit, Consolidated Traction Order Blue Print.")

(Objection to the reception in evidence of the above specified blue print is noted for the reason that the same is secondary, the original drawing from which the same was made not having been here produced nor its whereabouts explained, and for the further reason that said blue print is irrelevant and immaterial to any question involved in this case.)

Q. 34. I hand you "Defendant's Exhibit, Buck 1871 Patent." Please state whether or not you have read and considered this patent and understand the construction therein described.

A. I have read and considered this and believe I understand the construction therein described.

Q. 35. Please state what you understand that construction to be, and whether or not, in your opinion as a practical truck man, it is applicable to the requirements of modern electric street railway practice. Give your reasons for any opinion you may express.

A. I understand the construction shown is for what is known as a steam car truck having a long wheel base. The longitudinal springs are opposite and between the wheels; to make these springs of proper length, in order to carry a car body satisfactorily, would make the wheel base of the truck in excess of seven feet. The use of the trans-

verse semi-elliptic springs, which I understand is only to be considered as a spring on extraordinary occasions, would prevent the use of a motor on the axle hanging within the wheel base without making it considerably greater than seven feet as I have stated above, and a truck of seven feet wheel base cannot be used under the ordinary electric car for city service in use at the present day. If motors were mounted with their free end supported outside the wheel base, this would also lengthen the truck to a degree making its use impossible under ordinary electric cars. Again, I do not consider the spring support for the car body adequate for modern practice, as the car would be practically riding on semi-elliptic springs, one at either end of the bolster. It is a well-known fact that elliptic springs are harsh-riding springs when they are used alone. Should the springs R and Q come into use at any time as springs, I consider this would be a dangerous truck to use as this spring is supported  
 536 at its center on a bolt T, which would allow it to rock, and should a car run into a curve there would be danger of it overturning, due to the shifting of the center of gravity caused by the rocking of the springs R and Q.

Q. 36. State whether or not, in your opinion, the Buck spring system could be so reduced as to permit it to be placed between the wheels of a truck carrying a four-foot wheel base or nearly a four-foot wheel base. Give your reasons for any opinion you may express.

(Objected to as irrelevant and immaterial.)

A. I do not consider that it could be placed on a truck of the wheel base described, as it would shorten the springs P and O to such an extent that they would be practically rigid bars.

Q. 27. In the Buck construction, where is the point of suspension of the semi-elliptic springs, as compared with the point of suspension in the truck in controversy?

A. The suspension of the semi-elliptic springs in the Buck patent is from the center of the cross pieces of the truck, that is, the so-called springs Q and R are supported at the center of the cross pieces with their ends in contact with the same cross pieces, and the longitudinally disposed semi-elliptics are connected and supported from the ends of these springs R and Q. In the Brill 27-G truck in controversy the semi-elliptic springs are supported on spiral springs, which in turn are supported from the side frame of the truck near the pedestal and journal box, which is outside and opposite the wheels.

Q. 38. Have you prepared an enlarged reproduction of the drawing of "Defendant's Exhibit, Buck 1871 Patent"?

A. I have had such a drawing prepared, and have a blue print made from same before me. This is a reproduction of a Patent Office copy enlarged three times, with addition of motors.

Q. 39. What else did the drawing show?

(The above question is objected to and all reference to the blue print mentioned in answer 38, for the reason that such blue print is at best secondary evidence, the original drawing from which it was made not having been produced nor its whereabouts explained.)

A. This print shows on one end by dotted lines the outline of a

motor between the axle and the bolster, how it would interfere with the so-called spring Q on the other end; the outline of a motor supported with its free end on the outside of the truck, how it would interfere with the cross piece of the truck.

Adjourned to meet at the same place, Wednesday, July 12, 1905, at 10.30 o'clock A. M.

537 POST OFFICE BUILDING, PHILADELPHIA, *July 12, 1905.*

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Joseph L. Levy, Esq., and Francis Rawle, Esq., for Complainants; Warfield & Duell, Counsel for Defendant.

Direct examination of Mr. ADAMS continued:

Q. 40. I call your attention to the paragraph of the Buck Patent No. 112,898, in which the following language appears: "but having sufficient flexibility to be brought into use as springs on any extraordinary occasion."

State what your understanding of the language used in that paragraph is, in connection with intended construction and mode of operation of the truck shown in the Buck patent, giving special reference to the matter quoted.

(The question is objected to on the ground that the witness has not qualified as an expert in matters relating to the interpretation of letters patent; furthermore, because it is immaterial and speculative.)

A. It is our practice to design springs so they will carry the car body and its maximum load when the car is standing still having about forty per cent. additional capacity to take care of the shocks and blows due to a moving car. The above conditions are ordinary conditions, and when they are exceeded they are extraordinary conditions.

I would consider that only when the above conditions are exceeded would the so-called springs Q and R act as springs.

Q. 41. From your understanding of the construction shown and described in the Buck patent, when, if at all, are the longitudinal semi-elliptic springs O P spring-supported?

(Same objection.)

A. If on an extraordinary occasion, as described above, a car were perfectly balanced, and standing still, then the longitudinal springs would be spring-supported for that period, as it is impossible to load a car with passengers so it would be balanced, and also due to the inequalities of the track when the car is running, the car would set up a rocking motion in which event one end of the semi-elliptic springs R and Q would always be in contact with the cross timber, therefore with the exception of the moment described, the longitudinal springs P and O would not be spring-supported.

Q. 42. Can you tell by examination of the Buck patent whether

that truck was intended for use under passenger or freight car? If you can, state which it is.

538 A. The Buck patent shows a truck that is to be used under steam passenger cars, and describes how a rigid equalizer bar may take the place of the so-called springs O and P for freight cars.

Q. 43. If you know, state whether freight cars are loaded with any regard to evenly balancing the load carried upon the trucks, or whether they are loaded without regard to even balance.

A. They are loaded without regard to even balancing on the trucks.

Q. 44. Did you intend to testify in answer to question 40, that the practice you referred to as "our practice," was that of the J. G. Brill Company?

A. Yes.

Q. 45. Do you know how far that practice is and has been followed by other car and truck builders and how long such practice has subsisted?

A. I have every reason to believe that this practice is followed by other builders, and has been in use ever since electric trucks were built.

Q. 46. Do I understand by your answer to question 40 that, in addition to the spring supporting its maximum load when the car is standing still, the spring system of a car should have the capacity of spring resisting an additional load due to shock, amounting to approximately 40 per cent. of the said maximum load, without putting the springs out of commission, or as it is technically called, closing them?

A. Yes.

Q. 47. I will ask you to compare briefly the car body supporting spring system of the Brill 27-G and Peckham 14-B-3 trucks on the one hand, with the car body supporting spring system of the Buck truck, as shown in the Buck patent, on the other hand, from the point of view of the stability or instability of such spring system for supporting a car body thereon?

A. The spring system in the Brill and Peckham trucks are supported from the side frames by means of semi-elliptic springs, being supported on spiral springs, which is supported from the side frames, as stated, the bolsters rest on the centers of the semi-elliptic springs under the side bar, and the car body rests on the bolster. By this system of suspension it insures great stability for the car body under all conditions.

In the Buck patent the spring system is supported from the center of the truck, and on extraordinary occasions, when the longitudinal semi-elliptic springs are spring-supported, there is complete instability of the spring system.

Q. 48. What is the character of the spring system of the Buck truck with regard to the easy-riding qualities thereof, under ordinary conditions when the so-called springs Q R are inactive, as you testified?

(Objected to as immaterial, irrelevant and as speculative.)

A. It is a well-known fact that when an elliptic form of spring is used alone it is a hard-riding spring where it has to be made to accommodate the light and maximum loads. This is the condition of the Buck truck under ordinary conditions.

Q. 49. Is that the condition of the spring system of Brill 27-G and Peckham 14-B-3, under what you deem ordinary conditions of service?

539 A. No, the spring system on the Brill 27-G and Peckham 14-B-3 has the ends of the semi-elliptic springs spring-supported from spiral springs from the side bars. By this combination of the two forms of springs it makes a very easy-riding car.

Q. 50. I ask you to compare the structure shown in the Buck patent with the structure illustrated in "Defendant's Exhibit, Buck Truck Model" and point out any similarities or dissimilarities which, in your opinion, exist between the said patent and the said model.

(Objected to for the reason that the witness has not been qualified to testify regarding specifications of letters patent, and is therefore incompetent to answer the above question.)

(Complainants' counsel responds that the witness has not been called to testify as a patent expert, but as a mechanic expert in the truck art. If the objection is that the witness is not competent to understand the structure shown and described in this Buck patent or in any other patent presented to him, and is further not competent to understand and describe the various structures shown in the various models already and hereafter to be shown him, the proper time for the examination of the witness as to his qualifications was when his testimony on this line was commenced, and the witness is now, at this juncture, offered to defendant's counsel for the purpose of examination as to his qualifications.)

(Defendant's counsel in reply states that the qualifications of complainants' witnesses are not within the province of defendant's counsel and that such qualifications, if indeed the witness has any, should have been made of record or brought out by complainants' counsel before the witness was examined as to the merits of any issues in this case.)

A. The Buck patent states the springs Q R are to be brought into use on extraordinary occasions. The springs shown on "Defendant's Exhibit, Buck Truck Model" would come into use on the most ordinary occasions, and would set up the rocking motion which I have previously described. The straps which are fastened to the cross timbers on either side of bolster, and which strap runs below the bolster, is made much shallower, proportionately, than shown in the Buck patent drawing. A car with the maximum load would allow the bolster to settle down on this strap, thereby rendering the spring system useless. If this strap were made proportionately deep on the model, as shown in the drawing of the Buck patent, this would allow the rocking motion to be aggravated and making the use of this spring system dangerous. In the patent the top shackle that is attached to the ends of the springs Q R is in contact on the under side of the cross timber; this contact would retard, if not totally destroy, the capacity



of the springs P O to swing transversely of the truck. The model has been made in such a way that these shackles do not come in contact with the cross timber. The ends of the longitudinal semi-elliptic springs come opposite to the diameter of the wheels in the Buck patent. In the model they are made to come between the wheels transversely. The truck frame in the model is not made in accordance with the Buck patent, as it does not show the diagonal pieces connecting the cross timbers.

540 Q. 51. Do you find in the Buck patent any provision for permitting the bolster N to bodily move in the direction of the length of the truck to or from the cross ties E and E'?

(Objected to as immaterial and incompetent, and the objection to question 50 is repeated.)

A. I do not. The straps V, which are attached to the tops of the center cross ties E and E', pass down between the cross ties and the bolster. The friction plates *v* which are attached to the sides of the bolster and impinge against the straps V described, there being merely sufficient play for a vertical movement of the bolster.

Q. 52. Do you find such a movement of the bolster bodily in the direction of the length of the truck between the cross ties in defendant's model of the Buck truck?

(Objected to as immaterial and irrelevant.)

A. I do not find such a movement.

Q. 53. What effect has this movement in the model upon the capacity of moving the longitudinal semi-elliptic springs bodily longitudinally of the truck?

(Same objection.)

A. These semi-elliptic springs are attached to the bolster and move with it in the direction of the length of the truck.

Q. 54. Do you find any such movement of these longitudinal semi-elliptic springs provided for in the structure of the Buck patent?

(Objection to question 50 repeated.)

A. No, I do not.

Q. 55. In the Buck patent longitudinal equalizer bars I are shown and described as resting upon the axle boxes at their ends, upon which equalizing bars are equalizer springs in the shape of rubber cushion G, and on these equalizer springs the side timbers A and B rest. To these side timbers are secured the intermediate, center and outside cross ties. State what the object of supporting the truck frame, including its cross ties or timbers, upon the equalizer springs and the equalizer springs in turn on equalizer bars I, and they in turn upon the axle boxes, is in the structure of the Buck patent.

(Objection to question 50 repeated, and the question is also objected to as leading; and further, that it involves an attempt by complainants' counsel to inject into the record his own language in describing structure set forth in the Buck patent.)

A. The object is to better distribute or equalize the weight of the car and its load on the track where the track is imperfect.

Q. 56. Do Master Car Builders' trucks or trucks of that type embody such a construction substantially as recited in the last question?

A. They embody the same features.

Q. 57. Do Master Car Builders' trucks or trucks of that type have springs other than those on the equalizer bars for supporting the bolster?

(Same objection.)

A. They do have springs which are supported from the cross timbers of the truck, the bolster resting on these springs.

541 Q. 58. Do you find any analogy between the usual bolster supporting springs of the Master Car Builders' truck and the longitudinal and transverse leaf springs shown in the Buck patent? If you answer yes, state what analogy you find exists between them.

(Objection to question 50 repeated, and also because the question is leading.)

A. Yes, in both cases the springs referred to are supported from the cross timbers of the truck. In the Buck patent they are supported at the center of the cross timbers; in the Master Car Builders' type of truck they are supported on the cross timbers between their center and the side frames of the truck.

Q. 59. I ask that your attention be given to "Complainants' Exhibit, Model Buck Truck." If you know anything about the construction of that model, state what you do know about it.

A. I had this model made from the drawing which is marked "Complainants' Exhibit Enlarged Buck Patent Drawing." I compared this model with the drawing and found it was made in accordance with it.

Q. 60. Did you give any personal supervision to the construction of this model?

A. I did.

Q. 61. I ask you to compare the said model with the Buck patent and state whether or not said model faithfully embodies the construction which you understand to be described and shown in the Buck patent.

(Objection to question 50 repeated.)

A. It does.

Q. 62. I call your attention to the patent to Overbagh, No. 104, 876, dated June 28, 1870. Have you read and do you understand the construction shown and described in that patent?

(The question is objected to on the same grounds referred to in the objection noted to question 50.)

A. Yes.

Q. 63. I ask you to state, briefly, your understanding of the construction and mode of operation of the truck shown and described in that patent, with special reference to that part of the specification in which the following words appear:



"In the drawing I have shown a single joint at one end of the equalizer, but it may be necessary to use a double joint to allow for motion of the bar."

(Same objection as to witness's qualifications.)

A. This is a truck having equalizer bars, one end of which is supported on the journal boxes, the other end being supported from the truck frame, springs being mounted on the equalizer bars and supporting the truck frame.

In reference to the statement in the patent that "it may be necessary to use a double joint," I understand that this additional joint may be necessary to relieve a bolt *a* from strain in the hole; that is, through the truck frame A, due to the arc, the eye in the  
542 end of the equalizer will describe when truck is used with light or maximum loads.

Q. 64. State what would happen, in your opinion, if another joint were added to or interposed between the ends of the equalizing bar D and the ends of the vertical bolt *a*, having a longitudinal pivot, apparently intended to permit of a transverse swing of the bar D.

(Same objection.)

A. I do not consider another joint added would allow of a transverse swing of the vertical bolt.

Q. 65. If another joint were added to the support of the equalizing bars D in the Overbagh patent, would that joint permit said equalizing bars to swing transversely of the truck, as the parts are constructed and assembled in that truck?

(The objection to this line of questioning is repeated on account of the qualifications of the witness to answer the same.)

A. No, they would not be able to swing transversely, for the reason that the equalizing bar on one end runs between walls on the pedestal casting which would prevent any transverse swing; and for the further reason that they have a flat support on the top of the journal box equal to the thickness of the equalizing bar.

Q. 66. In the Overbagh patent, is there any provision made for a relative movement transversely of the truck of the frame, the axle box pedestals, the axle boxes, the equalizer bars, the fulcrum springs E and the bolt *a*; that is, are they adapted to have transverse movements independently of each other, or are they intended to have transverse movement, if any, altogether? Which is the correct statement, according to your opinion?

(Same objection.)

A. They do not have any transverse movement in relation to each other.

Q. 67. If the construction of the Overbagh patent was modified to the extent of providing for a transverse swing of the equalizing bars D, would such movement, in your opinion, affect the support of the so-called fulcrum springs E on said bars?

(The objection above noted is repeated, and the question is also objected to, as it is clearly hypothetical and speculative.)

A. If there were a transverse spring provided so that alignment vertically of the equalizing bar D and the truck frame A. would be shifted, I consider it would unseat the fulcrum spring E.

Recess.

Q. 68. I ask you to examine "Defendants Exhibit, Overbagh Spring Hanger," and compare it with the Overbagh patent and state in what respect the exhibit model agrees or disagrees with the structure shown in that patent.

(The objection as to the competency of the witness as to answering this line of questions is repeated.)

A. It is different in that the bolt *a*, which runs up the truck frame A, is loosely fitted on one end of the model and these bolts support, by means of a jointed link, a semi-elliptic spring in the model in place of the equalizing bar, each bolt supporting one end of the semi-elliptic spring.

Q. 69. Has the semi-elliptic spring in that model any capacity for transverse swing bodily, that is, provided for it in its support?

A. No.

Q. 70. In the model, does any swing of the semi-elliptic spring involve a swing of the bolt *a* or a compressive action of the spring or cushion which supports the upper ends of those bolts?

A. No.

Q. 71. State whether or not it is absolutely essential to passenger trucks, especially those having swing bolsters, that the bolster and its supporting springs be capable of a transverse swing or movement relative to the truck frame.

A. It is necessary that the bolster and its supporting springs have this transverse movement, both for relieving the truck and car body of undue strain when curving and also for the comfort of passengers. I do not know of any well-known truck that is used but what is provided with this transverse movement for passenger car service, and in many cases, even on freight car trucks.

Q. 72. I ask you to compare the structure shown in the patent to L. B. Thyng, No. 4276, dated November 18, 1845, with "Defendant's Exhibit, Thyng Truck." State whether the position of the bolster relative to the under side of the side frame and the condition of the arch of the semi-elliptic spring, in the model, agrees with the condition of those two elements, as shown in said Thyng patent.

(Objection to question 50 repeated.)

A. The Thyng patent shows the upper side of the bolster close to or in actual contact with the under side of the frame of the truck. The model referred to shows the top of the bolster a very considerable distance away from the under side of the truck frame, which thereby allows the semi-elliptic springs to be very much flatter than shown in the Thyng patent.

If the bolster in the model were like that shown in the patent, that

is, close to or in contact with the frame, it would make considerably more arch in the semi-elliptic spring, when a load was imposed on the semi-elliptic spring, causing it to flatten; it would strain the links or shackles where it is fastened to the side frame of the truck to such a degree that it would strain or bend some parts of this shackle, making their use unsafe.

Q. 73. Have you read and do you understand the patent to E. Peckham, No. 563,685, dated July 7, 1896, with especial reference to the motor support shown in Fig. 4 thereof?

(Objection as to the incompetency of the witness repeated.)

A. I have and I do.

Q. 74. Compare the motor-supporting structure shown in Fig. 4 of that patent, so far as it embraces the bolt 29, the springs 30, 544 30a, and the casting 32 through which the bolt passes, with the means employed in "Defendant's Exhibit. Model of Thyng Truck," at the end marked "Model Thyng, 1845 Truck, Combined with Peckham, 1896, Spring Link," for supporting one end of the semi-elliptic spring at that side of the truck, and state whether or not the motor-supporting device of the Peckham patent has been incorporated into this Thyng model in the same way that said motor-supporting device exists in the said Peckham patent.

(Same objection.)

A. The supporting device on the end of the semi-elliptic spring of the model referred to is not like the Peckham motor-supporting bolt referred to in the following respects: The spring 30 in the patent is in contact with the bottom of the casting 32; in the model it is not so, but is against a cap which is on the bolt, said cap being a very considerable distance below the part of the truck side frame that corresponds to the casting No. 32 in the Peckham patent. The hole in the casting 32 through which the bolt No. 29 passes shows the sides parallel with the bolt. In the model truck this hole is made considerably larger in diameter at the bottom than at the top. In the patent the bolt cannot swing freely, on account of the friction of spring 30 against casting 32, and also on account of the size of the hole in casting 32, and if it should move to one side, the bolt would come against the sharp corner at the base of the hole in casting 32, causing it to wear the bolt at this point, and causing a fracture.

In the model this hole at the base of the side frame corresponding to casting 32 is made large enough to allow the bolt 29 to swing.

Q. 75. Have you read and do you understand the patent to C. M. Haskins, No. 330,023, dated November 10, 1885?

(Same objection as to the incompetency of the witness.)

A. I have read and do understand it.

Q. 76. I ask you to look at Fig. 1 of sheet 1 of the drawing forming part of the specification of that patent and state whether or not, in your opinion, the wagon body A, the spring F and that part which is called in the patent the "spiral spring C," are capable of practically

and mechanically swinging on the pin *e* transversely, that is, in the direction of the length of the spring F.

(Same objection.)

A. In my opinion it is not capable of swinging in the direction of the spring F.

Q. 77. I ask you to look at "Defendant's Exhibit, Model of the Thyng Truck," and especially at that side of the truck model which purports to show a part of the Thyng 1845 truck combined with Haskins 1885 spring link, and state whether the device there used at the end of the semi-elliptic spring to support the same from the side frame permits of a movement of the spring and the supporting device in a direction longitudinally of the truck.

(Same objection.)

A. Only through the unmechanical looseness of the parts supporting the ends of the semi-elliptic spring referred to is there any longitudinal movement in this device and that to a limited degree only.

If this Haskins device were made in accordance with the patent, as shown in Fig. 1, any longitudinal movement would put a strain on the different parts, causing them to be strained or bent.

Q. 78. Has the longitudinal movement of the Haskins so-called hanger, as it is used in that truck model, to whatever extent that longitudinal movement may be, been provided for in the model in the same way as the longitudinal movement of the same parts have been provided for in the structure shown in Fig. 1 of the Haskins patent?

(Same objection.)

A. There is no longitudinal movement provided for in the Haskins hanger shown in Fig. 1. There is no longitudinal movement provided for in the model referred to.

Q. 79. Is the disposition of the pin *e* which supports the "spiral spring C" in Fig. 1 of the Haskins patent the same as the disposition of the pin which supports the presumably like parts in the "Defendant's Exhibit, Thyng Truck Model"?

(Same objection, and also what is meant by "presumably like parts.")

A. The disposition of the pin is the same in both cases.

Q. 80. In what direction does the pin *e* extend in Fig. 1 of the Haskins patent, relatively to the length of the spring F?

(Same objection.)

A. The length of the pin *e* is in the same direction as the length of the spring F.

Q. 81. In what direction does the pin *e* in Fig. 1 of the Haskins patent extend, relative to the direction of the length of the wagon body?

(Same objection.)

A. The length of the pin *e* is at right angles to the length of the wagon body.

Q. 82. In what direction does the pin, as used in the alleged Haskins hanger in this Thyng truck model, extend, relative to the length of the truck?

A. The length of the pin is in the same direction as the length of the truck.

Q. 83. Then has the pin *e* in the Haskins patent the same relative direction as it has in the Thyng truck model?

(Same objection.)

A. No; in the Haskins patent it is shown at right angles to the way it is shown in the model.

Q. 84. What effect, if any, have the changes or alterations which you testify have been made in the motor-hanging bolt of the Peckham patent 563,685, and in the spiral spring C of the Haskins patent, in placing those devices in defendant's model of the Thyng truck, upon the support of the semi-elliptic spring at that side of the model, to which those devices have been applied?

(Same objection, also as speculative.)

546 A. By combining these different devices on the same model, it gives a flexibility to the semi-elliptic spring that it would not have if one of these devices only were used on the truck, and also by their unmechanical looseness of the various parts.

Q. 85. Are you the Walter S. Adams named as the patentee in "Defendant's Exhibit, Adams 1895 Patent, No. 533,858," dated May 7, 1895, a copy of which I now show you?

A. I am.

Q. 86. Do you understand the construction therein shown and described?

A. Yes.

Q. 87. Is there in that construction any provision made for a transverse swing of the leaf spring F, the parts supported by said leaf spring, and the links G?

A. No, there is no provision made for transverse swing.

Q. 88. In the light of your added experience, since the 16th day of February, 1895, when you applied for that patent, do you deem the employment of a leaf spring, such as F, for supporting the car body sufficient for the purpose of procuring as efficient a spring support for the car body as is provided in the Brill 27-G or Peckham 14-B-3 truck? and further, in view of your experience since the above date, do you or do you not deem it necessary in trucks of this class to provide a transverse swing of the leaf spring F, in addition to providing for the spread of said spring?

A. I do not consider the semi-elliptic spring as shown in the patent referred to — be as efficient for use under cars as the spring system in the Brill and Peckham trucks referred to. My experience has been that it is very necessary to provide transverse swing of the semi-elliptic spring.

Q. 89. In the structure shown in the Adams patent above re-

ferred to, do any of the strains due to the propulsion of the truck come primarily on the leaf spring F?

A. No.

Q. 90. I call your attention to the Brill and Curwen patent No. 610,118, dated August 30, 1898, and 610,119, dated August 30, 1898. Do you understand the structures therein shown and described?

(Objection as to incompetency repeated.)

A. Yes, I do.

Q. 91. Is there any provision in the structures shown in either of these two patents for a longitudinal movement or swing of the spring links on the pins 17, as to patent 610,118, and 27 as to patent 610,119?

A. There is no provision made for such a movement.

Q. 92. What, if anything, prevents such a movement in those two structures?

A. Both the jaws, which are numbered 16 and 28 respectively in these patents, and the pins 15 and 27 respectively, would prevent any longitudinal movement or swing of these links.

547 Q. 93. I ask you to look at the patent to Graham, No. 503,044, dated August 8, 1893, and ask you to state whether you understand the construction shown in Fig. 3 of that patent?

(Objection to the incompetency of the witness to answer this line of questioning.)

A. I do understand it.

Q. 94. For what purpose is the spring system, consisting of the leaf spring *k* and the coiled springs *t*, employed in that structure?

(Same objection, and also because it is secondary.)

A. To give an easy-riding car that would be free from oscillation due to the combination of the spiral and semi-elliptic springs.

Q. 95. Is this truck shown in this Graham patent a pivotal truck? In answering this question please consider lines 92 to end of page 1, and two lines on page 2 of the specification of this patent.

A. This is a non-pivotal truck, the truck being secured rigidly to the car body.

Q. 96. Do the springs *k* and *t* take the place, in the structure of this Graham patent, of the usual axle box springs which are usually interposed between the axle boxes and the truck frame?

A. They do.

Q. 97. In the Graham patent, as shown in Fig. 3, upon which of the springs *k* or *t* does the weight of the car body first fall?

A. On the spiral springs.

Q. 98. What do the leaf springs *k* support?

A. The leaf springs *k* support the spiral springs and it, the spring *k*, is supported on the journals or axle box.

(At the request of complainants' counsel, defendant's counsel here stipulate that the time set by a decree of the court for taking rebuttal proofs be extended from July 15, 1905, to August 1, 1905,



provided that in case defendant's counsel shall not be present at any time during the taking of proofs during such extension, they may place their objections thereto upon the record immediately after appearing at any meeting, with the same effect as if made at the proper time, providing the witness shall still be upon the witness stand, but not thereafter, except that in a case of a witness occupying less than a day, the objections may be noted at any time during the session.)

Adjourned to meet Thursday, July 13, 1905, at 10.30 o'clock A. M., at the same place.

548 POST OFFICE BUILDING, PHILADELPHIA, *July 15, 1905.*

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Francis Rawle, Esq., and Joseph L. Levy, Esq., for Complainants, and Warfield & Duell, for Defendant.

Direct examination of Mr. ADAMS continued.

(Complainants' counsel offers in evidence the print referred to in questions 37, 38 and the answers thereto of the present deposition of the witness, and the same is marked "Complainants' Exhibit, Adams Three Times Enlarged Drawing of the Buck Patent Drawing.")

(Objection is made to the reception in evidence of the above specified blue print, for the reason that said print is secondary evidence, the original from which it was made not having been here produced, nor its whereabouts explained, and for the further reason that said blue print is immaterial and irrelevant to any issue in this cause.)

Q. 99. What was this print made from?

A. From an original drawing.

Q. 100. What was the tracing made from?

A. From a copy of patent No. 112,897, to C. S. Buck, dated March 21, 1871.

(Without admitting the relevancy or materiality of said tracing, defendant's counsel calls for such tracing from which said blue print is alleged to have been made.)

Q. 101. Where and when and under whose supervision and direction was that tracing made?

A. It was made at the works of the J. G. Brill Company about one year ago, or more, under my direct instruction or supervision.

(It was admitted by defendant's counsel that the print just offered in evidence was contained in and formed a part of Vol. III of the Transcript of Record in the United States Court of Appeals for the Third Circuit of the case of *North Jersey Street Railway Company, Appellant, vs. John A. Brill*, which transcript of record is official, and printed by the clerk of the court.)

Q. 102. Was this original drawing made on the same scale and the same size as Fig. 1 of the Buck patent, or was it enlarged?

A. It was enlarged three times.

Q. 103. Have you recently made any efforts to find this original tracing?

A. I have, but as yet have been unable to locate it. I have looked among the tracings and drawings that were in the possession of Mr. Francis Rawle.

549 Q. 104. State what is intended to be illustrated by the irregular dotted lines at the right and left-hand ends of the truck shown in this print.

(Objected to as incompetent, irrelevant and immaterial.)

A. The dotted lines represent the outline of an electric motor when mounted on the axle; the left end showing a motor with its free end within the wheel base, the right end showing the motor with its free end without the wheel base.

Q. 105. Is the motor in that print shown merely diagrammatically or is it shown in proper proportion to the diameter of the wheels and the width of the wheel base?

A. It is shown in its proper proportion to these parts.

Q. 106. Explain what the letters C B, S P, E C are intended to denote in that print.

A. The C B represents the cross bar which supports the free end of the motor; S P represents the side piece of the truck frame, and the E C represents the end cross piece of the truck.

Q. 107. Referring to the left hand of the drawing, could the motor be suspended within the truck frame, as indicated in dotted lines, without involving some change or alteration in the spring system of the truck there illustrated?

(Objected to as incompetent, immaterial and irrelevant, and furthermore as speculative.)

A. No, it could not. The motor occupies practically the entire distance between the wheels and has a length from the center of the axis to the extreme over its free end of at least 2 feet 6 inches. To mount a motor in a truck, as illustrated on the left-hand end of this blue print, would require at least 6 feet wheel base, the difference between the length of the motor would be required for the bolster and transom of the truck. This, of course, means that the spring system as illustrated would have to be altered and removed entirely from the center of the truck.

Q. 108. Would it be practical to shorten up the longitudinal springs O P, remove the cross pieces D and locate the springs Q R close up against the cross pieces E E', so as to cause said springs Q R to lie between the inner end of the motor and the cross pieces E E'?

(Same objection.)

A. To do this would necessitate a longer wheel base than I have stated. No, it would not be practical, as it would destroy the usefulness of the springs O P and they would become rigid bars.

Q. 109. What changes or alterations would have to be made in



the truck shown in this print to support the motor as shown at the right-hand end of said print, if any?

(Same objection.)

A. The side pieces of the truck would have to be made longer in order to let the end cross piece run beyond the extreme end of the motor.

Q. 110. Is this condition illustrated at the right-hand end of the print?

(Same objection.)

550 A. Yes, it is.

Q. 111. Under this condition, what would be the length over all of the truck?

(Same objection.)

A. The length over all would be 12 feet 9½ inches.

Q. 112. What is the wheel base of this Buck truck as you have determined it?

(Same objection.)

A. 7 feet 3 inches.

Q. 113. What have you taken as the basis of this measurement?

(Same objection.)

A. The copy of patent drawing was enlarged so the wheel would represent 30 inches in diameter on the tread line.

Q. 114. I hand you "Defendant's Exhibit, Proportional Wheel Bases," being a drawing. I call your attention to the top drawing representing the wheel base of the truck of the Buck patent under consideration. Is the wheel base in the above "Defendant's Exhibit of the Buck Truck" greater or smaller than you have made it?

A. It is 1 inch greater than I made it.

Q. 115. Would it be possible to use in electric railway practice, under any conditions which you know of, a truck of the size and characteristics when mounted with motors, such as shown in "Complainants' Exhibit, Adams Three Times Enlarged Drawing," now being considered?

(Objection to question 107 repeated.)

A. No, I do not consider that it would be practical to use such a truck.

Q. 116. Under the conditions named in the preceding question, could a truck having a pivotal radius of 5 feet 3½ inches, at least, at one end, or 6 feet 4¾ inches at the other end, be used under a car where the ascent or descent from the car is on the street and without the aid of a platform?

(Same objection.)

A. No, unless they were to increase the number of steps from the car down to the street.

Q. 117. Is the height of flooring of the car from the ground in electric railroad practice of any material consequence or not?

A. It is of vital importance both for safety and comfort.

Q. 118. How about speed in loading and unloading a car?

A. It is also of great importance in this direction, in order to allow for entrance and exit of passengers quickly.

Q. 119. In your opinion, can the wheel base of the Buck truck be shortened so as to make it 4 feet or 4 feet 6, which is, as I understand has been testified in this case, the prevailing practice in electric street railroading, without involving some material or substantial change or alteration in the structure or character of the spring system described and illustrated in this Buck patent?

(Objected to as speculative, immaterial and irrelevant.)

551 A. It would require a complete reorganization of the system in order to make a truck with as short as a 4-foot 6-inch wheel base, using motors on their axles.

Q. 120. What effect would such a reduction of wheel base have upon the length and resiliency of the longitudinal springs O P?

(Same objection.)

A. It would totally destroy their capacity for acting as springs, because they would have to be shortened so that they would practically be rigid bars.

(At this point, and after repeated remonstrances to complainants' counsel, it must be insisted by defendant's counsel that the witness be permitted to answer the questions as they are stated in the record without explanation or suggestion by complainants' counsel.)

Q. 121. What knowledge have you of the Maximum traction truck, especially of that of the Brill manufacture?

A. I believe I have very complete knowledge of the Maximum traction truck, especially of the Brill make.

Q. 122. State what you know, if anything, regarding its capacity for what is known in the electric railroading art as electric truck acceleration.

A. The Maximum traction truck is not as rapid an accelerating truck as the Brill 27-G and Peckham 14-B-3 truck.

Q. 123. Briefly state why not.

A. There are pony wheels on Maximum traction trucks, therefore only one pair of wheels can be used in connection with motors. It is necessary that a certain portion of the car and its load be carried on the pony wheels at all times. This allows only a portion of the car weight and its load to be carried on the wheels that are driven by the motor.

Q. 124. Briefly state what is meant in the trade by "electric truck acceleration."

A. The electric truck acceleration is the capacity to start quickly.

Q. 125. Has it anything to do with attaining a maximum speed within a minimum period of time?

A. Yes, that is what it means, to start quickly and to attain its maximum speed in the shortest possible time.

Q. 126. I refer you to "Defendant's Exhibit, Beach 1876 Patent,"

No. 173,257. Have you read this patent and do you understand the truck construction therein shown and described?

(The objection relating to the incompetency of this witness to testify regarding letters patent is repeated.)

A. I have read it and understand it.

Q. 127. State whether or not, in your opinion, the bolt H, shown in side elevation in Fig. 7 of the drawing of that patent, can have a swing longitudinally of the truck, on the pin D. Give your reasons for any opinion which you may express.

(Same objection.)

552 A. No, it cannot. The pin D is not a round pin; it has flat sides. This pin fits neatly through the link; this would make it impossible for the link to swing on the pin D.

Q. 128. Is a transverse swing of the bolt or link H on the pin d mechanically provided for in this Beach patent?

(Same objection.)

A. No, it is not.

I want to change my answer to question 127, so the answer will cover a transverse swing of the bolt H, and give the following answer to question 127:

This bolt H is not provided to have a bolt swing longitudinally of the truck, unless it rides up on one edge of the hole in the bolt on the pin. After the play that is in the hole under the pin has been taken up by the bottom of the link coming in contact with the pin, it would raise one end of the pin from its seat. By this unmechanical method only do I consider the bolt could swing longitudinally of the truck.

(At this point it must again be insisted by defendant's counsel that complainants' counsel desist from attempting to lead the witness or make suggestions as to the form of his answers. Defendant's counsel also states that the answer to question 128 was changed to read as it appears in the third paragraph of this said answer from the paragraph appearing at the beginning of the answer after a suggestion made to witness by complainants' counsel.)

(Complainants' counsel objects to the continued insinuations made by defendant's counsel as unfair, in the absence of any recitation of specific act by complainants' counsel. What is meant by a change in the answer is not understood.)

(Complainant's counsel denies that the answer to question 128 was "changed to read as it appears in the third paragraph, etc.," by reason of anything said or done by complainant's counsel. Complainants' counsel deems that it is hardly necessary to add that no evidence of the witness has been modified, changed or influenced by anything said or done by complainants' counsel.)

(Defendant's counsel simply states in reply that the change in the answer to question 128 is obvious, and inasmuch as he is unable to read the witness's mind, he cannot state positively that such change was made as a direct result of the suggestion of complainants' coun-

sel, above referred to, but further states that such change was made after a suggestion to the witness by complainants' counsel, which suggestion was in a tone of voice so low that defendant's counsel was unable to hear the same and therefore cannot state the nature thereof.)

Q. 129. What change did you make in your answer to question 128?

A. I changed the wording "longitudinally swinging" to "swing longitudinally."

Q. 130. Of your own suggestion or by reason of anything said to you by counsel?

A. Of my own suggestion, as I did not hear any suggestion in regard to the matter.

553 Q. 131. State whether or not the cap or part G' and the barrel G can swing or move at an angle to the walls of the "cylindrical spring case E" in the construction shown in the Beach patent.

(Objection as to incompetency of this witness repeated.)

A. No, it cannot.

Q. 132. Give your reasons for your answer.

A. Where these two parts fit together there is no space shown between them, so the barrel G could move at an angle to the walls of the spring case E.

Q. 133. Is the motion of the cap G' and barrel G confined to a perpendicular movement on the springs F, or not?

A. It is.

Q. 134. State whether or not, in your opinion, the bolt or link H has the capacity for a universal swing on the top of the springs F in this Beach patent.

(Objection as to the competency of the witness repeated.)

A. No, it has not.

Q. 135. State whether or not, in your opinion, admitting that the bolt or link H has some swing, does such swing necessarily involve a compression of the springs F in this Beach truck.

(Same objection.)

A. No.

Q. 136. How much of the following statement, which I quote from the deposition of Joseph H. Freeman, a witness on behalf of the defendant's herein, do you agree with: "The links of the Beach construction, like the links of the defendant's construction, are so connected to the cap plates that they have free or unrestrained pivotal movement in one direction only, to wit, transversely of the truck, and they are pivotally connected at their lower ends to the bolster so that the latter have free movement for a limited extent transversely of the truck in a manner common to swing bolster trucks."

The "defendant's construction," referred to above, you may take to be the Peckham 14-B-3 truck, in answering the question.

(Same objection as to competency of witness.)

A. I do not agree with this answer, in which it states the links of the Beach construction have free or unrestrained pivotal movement transversely of the truck, as the pin *d* which supports the Beach link has flat sides where it runs through the link. This would not allow the link to swing.

Q. 137. Does the bolster or part *D'* of the Beach truck have the "free movement for a limited extent transversely of the truck in a manner common to swing bolster trucks," as Mr. Freeman testifies

(Same objection.)

A. No, the link not swinging at the top as aforesaid cannot swing at the bottom where the bolster *D'* is supported.

Q. 138. I hand you "Defendant's Exhibit, Thyng Side Bar and Spring with Beach Spring Hanger." Is this model made in  
554 accordance with the Beach patent? Give your reasons for any opinion you may express.

A. No, it is not. The cylinder *G* where it fits into the bottom of spring *K C*, is very loose and not as shown in the patent. The link *H* and the pins *b* are not made in accordance with the Beach patent, as the pins in the model are shown round and in the patent they are shown with flat sides. Also the seat for the pin *D* on the appliance *G'* is not shown in the model to the depth shown in the patent.

Q. 139. I ask you to look at the wooden part of this model, which I understand purports to represent the side bar of the Thyng truck, as shown in that patent, No. 4276. Is that side bar made in accordance with the side bar of the Thyng patent?

A. No, it is not. The side bar in the model shows enlargements where the Beach spring hanger is supported.

Q. 140. What would be the effect of altering the side frame of the Thyng truck, at the point, say, where the shackles in that truck extend from the side frame, to make said Thyng side frame correspond with the side frame in this Beach model and to support the Beach spring casing, as suggested in the model?

(Objected to as speculative.)

A. This would materially weaken the side frame by recessing for the Beach link and springs; as this enlargement comes opposite to the wheel, it would greatly increase the width of the truck and the overhang on the axle outside of the wheel, in order that the wheels could be placed in the truck. All these things would be detrimental to the use of such a truck.

Q. 141. State what would be required for this adaptation, so far as the question of consequent weight of the side bar and its weakness or strength at certain points.

(Objected to as speculative.)

A. It would greatly increase the weight of the side bar, due to the enlargement; it would also weaken the side bar at the same point, which weakness would be due to the recess and the enlargement.

Q. 142. I call your attention to the wooden side bar in this Beach model, and also to the fact that the same has been fractured adjacent

to and through one of the enlargements. In your opinion, would such a fracture occur in a side bar made like that wooden side bar for adaptation into the Thyng truck?

(Objected to as speculative.)

A. In my opinion, the point indicated is the weakest in the side bar, and it is where it would break.

Q. 143. I ask your attention to the patent "Defendant's Exhibit Davenport and Bridges 1850 Patent," reissue number 183, dated December 3, 1850. Have you read and do you understand the construction shown and described in that patent?

(The objection to this line of questioning on account of the lack of qualifications of this witness to testify in relation to letters patent is repeated.)

555 A. I have read and understand it.

Q. 144. I call your attention to what are called in this Davenport and Bridges patent "metallic springs, or plates S S." In your opinion, are these plates springs? Are they shown as having the capacity for acting as springs? In answering this question please particularly consider Fig. 2 of that patent, and also consider "Defendant's Exhibit, Enlarged Drawing of Part of Fig. 2 of Davenport and Bridges Patent." Give your reasons for any opinion you may express.

(Same objection.)

A. No, I do not consider them springs. There is a piece which I consider wood, that runs the entire length of this plate between its centers; the plate is in contact with the wood the entire length; the plate is not made in the shape in which a spring is made and the wooden timber that is above it would absolutely prevent any spring action whatsoever.

Q. 145. Is the weight imposed upon the plates S that of a loaded or an empty car body?

(Same objection, and as immaterial and irrelevant.)

A. An empty car body.

Q. 146. Have the plates S any projection beyond the ends of the timbers R?

(Objected to as incompetent.)

A. Half of the hole where the plates are supported project beyond the timber.

Q. 147. Is that projection sufficient to enable the plates S to act as springs?

(Objected to as speculative.)

A. No.

Q. 148. What form of springs is shown in Figs. 1 and 2 of the drawing of this Davenport and Bridges patent, and which are referred to in the specifications of that patent as "springs W W"?

A. They are semi-elliptic springs.

Q. 149. In the Davenport and Bridges patent, where are the plates S S ultimately supported from?

(Objected to as incompetent, by reason of the lack of qualifications of the witness.)

A. They are supported from the ends of the semi-elliptic springs W W.

Q. 150. And upon what are the semi-elliptic springs W W supported.

(Same objection.)

A. From the transoms, which are the cross timbers of the truck adjacent to the bolster.

Q. 151. Relative to the side frames of the Davenport and Bridges truck, where are the semi-elliptic springs W W supported?

A. About midway between the center of the pivot of the truck and the side frames.

Q. 152. In this regard, what difference exists between the support of the spring system of this Davenport and Bridges truck, shown in Fig. 2, on the one hand, and the support of the spring system of the Brill 27-G and Peckham 14-B-3 trucks, on the other hand?

556 (Objection above mentioned again noted.)

A. In the Davenport and Bridges truck the semi-elliptic springs W W, being supported on the transoms some considerable distance within the gauge of the wheels, and also being supported centrally between the wheel base longitudinally of the truck, makes a very unstable support for the car body. Where the track is not in perfect condition, it would cause a rocking or rolling of the car body transversely, not only making it uncomfortable for passengers, but dangerous where maximum speeds were used.

In the Brill and Peckham trucks the spring support for the car body is at the side bar of the truck close to the pedestal. This gives the maximum stability that is obtainable in truck construction.

Q. 153. State whether or not, in your opinion, the Davenport and Bridges truck, as illustrated in Figs. 1 and 2 of the reissue patent 183, could be practically modified and formed into an electric motor truck having the desired and required wheel base—I refer to pivotal trucks—without an entire reorganization of at least the spring system of that truck. Give your reasons for any opinion you may express.

(Objected to as immaterial and irrelevant and the objection to the witness's lack of qualification is repeated.)

A. No, it could not. The wheel base would have to be greatly increased to allow of use of electric motors, so that they would not interfere with the plates S, together with its supporting hangers; also the spring system is not adapted for ease of riding and stability of car, as the entire car would be supported on four semi-elliptic springs, which would have to take care of both minimum and maximum loads, with the result that they would be hard riding.

Q. 154. State whether or not, in your opinion, any truck builder



could adapt the structure of the Davenport and Bridges patent to the uses and requirements of easy riding, speed of movement, proper support of motors, efficient braking system, economy in maintenance and repair, and perfect equalization of the superposed load, and consequent reduction in the cost of roadbed maintenance, without completely reorganizing the said Davenport and Bridges truck.

(Objected to as irrelevant, immaterial and speculative.)

A. They could not.

Recess.

Q. 155. I call your attention to "Defendant's Exhibit, Boughton 1892 Patent," No. 472,724. State upon what the springs D are supported in that patent.

(Objected to on the ground of the incompetency of the witness.)

A. On the axle.

Q. 156. I call your attention to "Defendant's Exhibit, Taylor 1891 Patent," No. 455,990. In your opinion, can the truck shown in this patent be made into a short wheel base motor truck to answer the present requirements without modification in the construction? Give your reasons for any opinion you may express.

557 (Same objection, and also because the question is speculative.)

A. No, it could not be used as a short wheel base truck, as the motors that are mounted on the axles would interfere with the elliptic springs N.

Q. 157. I call your attention to "Defendant's Exhibit, Taylor 1893 Patent," No. 507,050. As constructed and with the motor as there diagrammatically illustrated, does this patent, in your opinion, show a short wheel base truck?

(Objected to by reason of the incompetency of the witness; also, because the witness is not asked if he is familiar with the patent or has read the same.)

A. As this patent shows a motor between the axle and the bolster, and as motors are at least 2 feet 6 inches long, this truck would require approximately a 6-foot wheel base, which is not considered a short wheel base.

Q. 158. I ask you to look at "Defendant's Exhibit, Taylor 1893 Patent No. 1," No. 507,855. State whether you have read this patent and understand the truck construction therein described and illustrated, and if you answer yes, state whether or not with a motor as diagrammatically illustrated in Fig. 1 of the drawing of this patent, said truck is a short wheel base truck.

(Objection as to incompetency of witness repeated, and also on the ground of irrelevancy.)

A. My answer to the first part of the question is yes. This is not a short wheel base truck, as the motor is between the axle and



the bolster, and the wheel base would have to be approximately 6 feet.

Q. 159. I call your attention to "Defendant's Exhibit, Longstreth 1881 Patent," No. 249,962. State whether or not you have read this patent and understand the construction therein illustrated and described.

(Same objection as to incompetency.)

A. Yes.

Q. 160. State what the system of springs illustrated in Figs. 1 and 3 especially of this Longstreth patent support.

A. They support the locomotive axle box frame. Mr. Longstreth, the patentee, started me on my mechanical career, previous to 1880.

Q. 161. As intended by Longstreth, does that spring system support the locomotive boiler, or any part thereof, on the frame; or is the frame bolted rigidly to the boiler or locomotive proper?

(Objected to as speculative.)

A. The boiler and the locomotive proper are bolted to the frame.

Q. 162. In the construction shown in the Longstreth patent, are there any semi-elliptic springs supported on or deriving their support from the frame?

A. The semi-elliptic springs are supported on the axle boxes, and instead of being supported on the axle box frames, they support the said axle box frames.

Q. 163. In the construction of the Longstreth patent, is there any longitudinal or transverse swing provided for by the frame relative to the axle boxes?

A. No, there is not.

Q. 164. Are the problems involved in the spring suspension of a locomotive frame, such as shown in the Longstreth patent, similar to or different from those involved in the spring support of a car body on electric motor trucks?

(Objected to as being incompetent, the witness not being qualified as to his knowledge of the steam locomotive art; and further, that the question is irrelevant and immaterial.)

A. No, they are different.

Q. 165. Have you had any experience in locomotive building?

A. I worked at the Baldwin Locomotive Works for about four years, having learned my trade there as pattern maker.

Q. 166. Did that involve making patterns for locomotive frames?

A. Yes, making patterns for locomotive frames.

Q. 167. I ask your attention to the "Defendant's Exhibit, Hefferman 1889 Patent," No. 412,256. Have you read and do you understand the construction therein shown and described?

(Objected to as incompetent.)

A. Yes.

Q. 168. State whether or not the structure shown in the Hefferman patent is substantially of the same character and intended for

the same uses and purposes as that shown in the patent to Longstreth, just previously considered by you.

(Same objection.)

A. It is.

Q. 169. I call your attention to "Defendant's Exhibit, Baker 1896 Patent," No. 553,298. Have you read and do you understand the construction shown and described in that patent? I ask the same question with regard to the "Defendant's Exhibit, Romans 1862 Patent," No. 34,270.

A. Yes.

Q. 170. State whether or not the trucks shown in the said Baker and Romans patent, so far as they relate to the manner of use of semi-elliptic springs therein, is substantially, except as to details of arrangement the same as shown in your patent No. 538,858, being one of defendant's exhibits.

(Objection as to the incompetency of witness repeated.)

A. Yes, they are substantially the same.

Q. 171. I call your attention to "Defendant's Exhibit, Peckham 1890 Patent," No. 424,723, and "Defendant's Exhibit, Peckham 1891 Patent," No. 464,253. State whether you have read these patents and understand the construction therein shown and described, with special reference to the construction of the motor-suspending bolts shown therein.

(Same objection.)

A. Yes.

Q. 172. State whether or not, in your opinion, the motor-suspending bolt marked generally R' in Peckham patent 424,723, and the motor-suspending bolt j shown in Fig. 3 of Peckham patent 464,253, have a capacity for swinging from their upper ends. Give your reasons for any opinion you may express.

(Same objection.)

A. The bolts referred to are not free to swing from their upper ends. The one shown in patent 424,723 has the upper spring in contact with the under side of the bolt support. The hole through the end of the motor does not show any play surrounding this bolt. Either one of these destroys the freedom of the bolt to swing. The bolt shown in 454,253 patent shows both the upper cushion, which is on top of the support, and the lower cushion, which is under the support, in contact with the support which destroys the freedom of the bolt to swing.

Q. 173. Do either of these motor-suspending bolts of the two above-mentioned Peckham patents offer any suggestion as to their capability of substitution in the truck of the Thyng patent to produce the result achieved by the employment of pivotal links and springs in the Brill 27-G and Peckham 14-B-3 trucks?

(Objected to on the ground of incompetency of the witness, and

also as calling for a conclusion which the witness has not been shown qualified to give.)

A. No, they do not.

Q. 174. I call your attention to "Defendant's Exhibit, Cooke 1897 Patent," No. 595,045. Have you read and do you understand the construction shown and described in that patent?

(Same objection.)

A. Yes.

Q. 175. State whether or not, in your opinion, the said Cooke patent shows a bolster spring suspension, substantially identical in principle, with that employed in the Brill and Curwen trucks as they have been so termed in this case.

(Same objection.)

A. It is substantially the same.

Q. 176. State whether or not, in the construction shown in the Cooke patent, the links supporting the spiral springs 21, the rigid equalizing bar 20 and the bolster can have a movement or swing from their upper ends longitudinally or in the direction of the length of the truck.

(Same objection; also as leading.)

A. They cannot.

By Mr. RAWLE:

Q. 177. Defendant's witness, Joseph H. Freeman, in his examination on May 18th, stated in substance that the subject matter of claim 13 of the parent patent in suit was embodied in the patents to Thyng, Romans, Adams and Baker, "if such elastic and articulated connections as are found in patents to Cooke, Haskins, Buck, Davenport and Bridges, Overbush and Beach were employed" in the former patents, and the witness stated that "such substitution is  
560 clearly within the province of the ordinary mechanic skilled in the art of truck construction." Please state whether or not you agree with these statements as to the ordinary skilled mechanic.

(The question is objected to as being manifestly improper and incompetent on account of the lack of qualifications of this witness to answer questions of this character, and for the further reason that any answer given by this witness to the above question will be biased, and therefore worthless, because of his long association with the Brill Company, the complainants in this cause.)

A. I do not agree with this statement. I am one of the patentees mentioned and had been working on trucks exclusively for over five years previous to my taking out the patent referred to, in 1895; it did not occur to me to make such substitution stated, notwithstanding the fact that it was a very valuable feature in truck construction, both mechanically and financially, and I do not consider that it

would have occurred to any skilled mechanic to make this substitution.

Q. 178. State whether or not, in 1895, truck builders and other parties interested were looking for a new type of truck to meet the then requirements of the trade, and were working eagerly on the problems presented.

A. They were, and it meant great financial gain to any who could accomplish it.

Q. 179. At the session of May 19th, Joseph H. Freeman also testified, in substance, that the later electric practice had gone back to the character of spring connections between the truck frame and the car body "which were common in steam railway car trucks employed in former times." What have you to say as to this statement being true or otherwise?

(Objection to question 177 repeated.)

A. I do not agree with it.

Q. 180. In the same answer to cross-question 28, Mr. Freeman states, in substance, that the steam truck art of thirty to sixty years ago was exemplified in the patents to Buck, Davenport and Bridges, Thyng and Romans. What have you to say as to this? State also whether you ever saw the trucks of those patents in use or heard of them being used.

(Objection to question 177 repeated, and the latter part of the question being objected to as hearsay.)

A. I do not agree with that statement. I am acquainted with the various well-known makes of trucks, and even with some makes where there are few trucks built. I do not know of any trucks built or used that were made in accordance with the patents mentioned.

Q. 181. How about your reading of the art in technical books?

(Objected to, as the art referred to is not specified, making the question indefinite.)

A. I have never read of one of these trucks being used.

Q. 182. Compare the total weight of the largest modern electric street car carrying a full or maximum load, and having its motors, with a modern steam car coach with its full seating capacity occupied.

561 (Objected to as irrelevant and immaterial.)

A. The J. G. Brill Company have built electric cars that weighed 84,000 pounds on the tracks; this includes the weight of the trucks and motors; with 150 passengers would bring the weight up to over 104,000 pounds. The modern steam railway coach would fall many thousand pounds below this in weight with its load of passengers. I, of course, refer to the weight of the steam coach on the tracks, which includes the trucks.

Q. 183. The same witness, Mr. Freeman, in answer to cross-question 31, testified:

"It appears that when the comparatively recent and perhaps more rapid development in electric railways took place the steam railway

standards of former times again became available, and have been, in a measure at least, adopted by the electric railway truck car builders."

What can you say as to the truth of this statement?

A. I do not agree with this statement, as it has not been in accordance with my experience, except in a very limited degree only.

Q. 184. Are or are not the requirements of the steam and electric truck precisely the same, or even similar?

(Objected to as irrelevant and also as leading.)

A. They are not similar. The electric railway truck has to be designed to be practically a locomotive and a steam road truck combined, as far as results are obtained.

Q. 185. Defendant's witness, Mr. Freeman, in answer to redirect question 45 stated, in substance, that he agreed with an alleged former statement of yours, that "motor suspension is part of the truck construction." State whether or not motor suspension involves the same problems as are involved in the spring supports of car bodies on trucks.

(Objected to as immaterial and irrelevant.)

A. No, it does not.

Q. 186. Please make clear to the court the successive motions of the half-elliptic springs and the spring-supporting links when a car body mounted on a Brill 27-G truck is running, and meets an obstruction or a depression in the rails, by which a downward jar is brought about.

A. Such downward jar would cause the semi-elliptic springs to flatten, which would thereby extend their ends, causing the links that support these semi-elliptic springs to swing in a direction away from their support at the top. On the recovery of the semi-elliptic springs from the downward movement the links would swing back to the same position or beyond accordingly as the semi-elliptic springs were relieved from the force of the blow.

Q. 187. You state that under a downward jar the half-elliptic flattens and the spring links swing outwardly, state whether or not as the car body descends under these circumstances there is a downward movement of the ends of the half-elliptics pressing against the spirals in the links, thus making a composite swinging and downward motion.

562 A. There is such a downward movement combined with the swinging movement, under such conditions, and under all conditions where there is a swinging of the links there is downward movement of the ends of these semi-elliptic springs.

Q. 188. State whether or not in that case this downward movement of the semi-elliptic springs is cushioned by the spirals in the links.

A. It is.

Q. 189. At the instant of starting the car, state how the strains of starting are taken up, provided for and cushioned in the 27-G truck.

A. The starting of the car is by means of a motor which is on the

axle. This causes the axle box to come in contact with the pedestal of the side bar. The side bar and the transoms, being rigidly secured to each other, move and come in contact with the truck bolster, which is supported on semi-elliptic springs, cushioned on spring links, which have a universal movement from the truck bolster; the motion of starting is communicated to the car through the medium of a center plate, the lower one of which is supported to the truck bolster and the upper one to the car bolster.

Q. 190. State whether or not this strain of starting falls on the links and semi-elliptic springs.

A. This strain does not fall on the links and semi-elliptic springs; they are entirely relieved of this by the support of the semi-elliptic springs at their ends, being free to swing and let the truck transom come in contact with the truck bolster.

Q. 191. State the various conditions under which the spring support supplies resiliency in the support of the car body in order to provide an easy-riding car. That is, I have referred to obstacles and depressions in the track; what other conditions constantly arise?

A. The truck bolster which supports the car is supported at the center of the semi-elliptic springs, which springs at their ends are supported from the side bars by spring-supporting universally swinging links. This allows the truck bolster perfect freedom to swing transversely, longitudinally, diagonally and vertically in the truck between the transoms. The longitudinal swing in relation to the truck is restrained only by the bolster coming in contact with the truck transom. All of the above movements, together with the downward movement of the ends of the semi-elliptic springs, may be in operation at one and the same time.

Q. 192. What about strains when the car stops? when it slows down or accelerates its speed? when it strikes a sudden change of grade? when it strikes a zigzag or side irregularity of alignment in a track. State whether or not these conditions produce strains, and whether in the 27-G truck full provision is made for ample resiliency, so as to make an easy-riding truck under all these conditions.

A. All the above conditions are perfectly provided for in a similar manner to the starting of the car, as I have stated. The condition of the car rounding a curve is also perfectly provided for.

Q. 193. Compare the cost of the 27-G with the Brill and Curwen truck, under like conditions of service; which is the cheaper?

563 (Objected to as immaterial and irrelevant.)

A. The Brill 27-G truck is much the cheaper.

Q. 194. How as to comparative weight?

A. I would say that they were from 25 to 30 per cent. lighter in weight.

Q. 195. How about the number and complexity of parts, comparatively, constituting the spring support?

A. The number of parts in the 27-G is considerably less than in the Brill and Curwen truck.

## Cross-examination.

By WARFIELD & DUELL, without waiver of objections:

X Q. 196. Will you state what, if anything, you have done to prepare yourself to give testimony in this cause?

A. I have refreshed my memory on some things.

X Q. 197. Have you seen or read any of the testimony of preceding witnesses who have testified in this case?

A. No, I have not.

X Q. 198. Have you read the testimony, or any of the testimony, or has your attention been directed to any part of that given by complainants' expert, Mr. Livermore?

A. I have no recollection of seeing any such testimony.

X Q. 199. Were you called as a witness in the North Jersey case?

A. I was.

X Q. 200. Have you ever read the testimony of Mr. Livermore in the North Jersey case?

A. I have no recollection of doing so.

X Q. 201. On what did you refresh your memory to give testimony in this case?

A. Looking at patents; looking up some dates among the records of the J. G. Brill Company. I do not recall any other things that I refreshed my memory on.

X Q. 202. When did you look at the patents you refer to?

A. During the last few days. The patents referred to are those which are termed "Defendant's Exhibits."

X Q. 203. Have you conferred with any of complainant's counsel regarding testimony you might give in this cause?

(Objected to as irrelevant and inadmissible.)

A. They have asked my opinion on different matters, and I gave it.

X Q. 204. Have you discussed with complainants' counsel the construction and mode of operation of any of the patents you have testified to or about?

A. As stated before, they have asked my opinion on things in regard to these patents. I consider that discussion.

X Q. 205. During these discussions you refer to, did you have copies of patents you have testified about before you?

A. I did.

564 X Q. 206. Upon how many occasions have these discussions been held?

(Same objection.)

A. I do not recall how many; some of them have been right in this room, when counsel for both sides have been present.

X Q. 207. At these or during these discussions you refer to, did complainants' counsel make notes upon slips of paper about points you were to be asked?

(Same objection.)



A. He may have done so, for all I know. I was not watching him what he was doing at the time.

X Q. 208. Then you will not state that he did not make a memorandum of the points you were to be asked about?

A. I will not state either way for I did not take particular notice. I cannot state more than I have stated above.

X Q. 209. Did you have a conference or discussion with any of complainants' counsel on Tuesday evening, July 11th, regarding testimony you would give in this cause the following morning?

A. He asked my opinion on certain matters, which I gave him.

X Q. 210. Did complainants' counsel ask for an adjournment at an earlier hour at yesterday's session than he did on the preceding day?

(Same objection.)

A. I have no recollection of him so doing.

X Q. 211. Did you or complainants' counsel not, as a matter of fact, take copies of certain patents after yesterday's adjournment into a room adjoining this one at the conclusion of yesterday's session?

(Same objection.)

A. Yes, that is so.

X Q. 212. At the time, did you discuss with complainants' counsel any of the patents about which you have testified at today's session?

(Same objection.)

A. Most all the patents that I have testified to today were read over by me previous to yesterday; those that I read over yesterday were to refresh my memory.

X Q. 213. Then some of the patents you have testified to at today's session you had not read over before today?

(Same objection.)

A. I think it is probable that I have read over all of the patents that I have testified to today, though I have never previously testified to some of them.

X Q. 214. Then what do you mean by the phrase "most all the patents" appearing in your answer to question 212?

(Same objection.)

A. I have a distinct recollection of having read most all of the patents referred to, and I am of the opinion that I have read all of them some time in the past.

X Q. 215. Then you are not sure that you have even read all of the patents you have testified about?

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A. I am sure of having read them, but not all of them previous to yesterday and today.

X Q. 216. Then your knowledge as to some of these patents which you have testified to has been gained since the session of yesterday; is that true?



A. That may be so. The patents are very clear to me, even though it is so.

X Q. 217. Have you considered "Defendant's Exhibit, Buck 1871 Patent" and discussed the same with counsel for complainants?

(Same objection.)

A. I was asked questions in regard to this patent, which I answered.

X Q. 218. I ask the same question regarding "Defendant's Model Buck Truck."

COMPLAINANTS' COUNSEL: I make the same objection.

A. I make the same answer to this question.

X Q. 219. I ask you if you have considered and discussed with complainants' counsel the following list of patents testified to by you?

Overbagh, 104,876.  
Thyng, 4276.  
Peckham, 563,685.  
Haskins, 330,023.  
Adams, 538,858.  
Brill & Curwen, 610,118 and 610,119.  
Graham, 503,044.  
Beach, 173,257.  
Davenport & Bridges, 1850 Patent, Reissue No. 183.  
Boughton, 1892, No. 472,274.  
Taylor, 455,990.  
Taylor, 507,050.  
Taylor, 507,855.  
Longstreth, 249,962.  
Heffernan, 412,256.  
Baker, 553,298.  
Romans, 34,270.  
Peckham, 424,273.  
Peckham, 464,253.

(Objected to as irrelevant and inadmissible. Notice to strike out this question and the entire examination along these lines is given, costs to be taxed against the defendant in any event.)

(Defendant's counsel at this point states that the examination along these lines is deemed proper by reason of the witness testifying to the construction and mode of operation of said patents after conference with complainants' attorney, before and after each session; said witness not having been qualified as to his qualifications and fitness to testify as an expert regarding the specification and scope of letters patent. It is further deemed proper by reason of the witness's long connection with the Brill Company, the complainants in this cause, as showing bias to such an extent as to unfit him to give opinion of any weight whatever.)

566 (Complainants' counsel objects to the placing of arguments on the record.)

A. Some of the patents referred to I was asked questions about; others were given to me to read without asking any questions.

Adjourned to meet in the same place, Friday, July 14, 1905, at 11.15-o'clock A. M.

POST OFFICE BUILDING,  
PHILADELPHIA, July 14, 1905.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner. Francis Rawle, Esq., for Complainants. Warfield & Duell, for Defendant.

Cross-examination of Mr. ADAMS continued.

X Q. 220. Have you discussed any of the various models about which you have testified with complainants' counsel?

(Same objection as being irrelevant and inadmissible, and as merely tending to show *at best* that complainants' counsel have performed their well-known professional duty to their clients by interrogating the witness before placing him on the witness stand.)

A. I was asked certain questions about these models which I answered.

X Q. 221. How long have you been employed by the Brill Company?

A. Over twenty years.

X Q. 222. Before entering their employment, were you employed by any other truck company?

A. Previous to entering their employ I was employed by the Baldwin Locomotive Works; while this was not known as a truck company, they built trucks.

X Q. 223. Do you know of any other suits for infringement of letters patent besides this one and the North Jersey case, being brought by John A. Brill or the Brill Company?

A. Yes.

X Q. 224. Will you name some of those suits?

A. One was against, I believe, the Delaware County and Philadelphia Electric Railway Company; another was against the Third Avenue Railroad Company, New York City; another was against the Washington Railway and Electric Company. I do not recall any others at the present time.

X Q. 225. Have you previously testified for the Brill Company or John A. Brill in suits brought against other defendants?

A. Yes, I have.

367 X Q. 226. Are you interested in the Brill Company, in any other capacity save that of an employee?

A. No.

X Q. 227. Do you hold any stock of the Brill Company?

A. I do not.

X Q. 228. Do you know the amount of capitalization of the Brill Company?

A. No, I do not.

X Q. 229. Do you know the approximate amount of such capitalization?

A. No, I do not.

X Q. 230. How many plants have the Brill Company?

A. There is only one plant, I understand, that is under the name of the Brill Company.

X Q. 231. Are they associated with any other plant in the manufacture of trucks or rolling stock, acting under any other name?

(Objected to as immaterial and as inadmissible.)

A. Whether they are associated as a company or as individuals with another plant I am unable to say; they are, however, associated with other plants in some capacity.

X Q. 232. Will you name some of the companies or individuals which you refer to?

A. The names of these companies are the American Car Company, G. C. Kuhlman Car Company and John Stephenson Company.

X Q. 233. Do you know of any others?

A. I do not.

X Q. 234. Where are the plants of these several companies located?

A. St. Louis, Cleveland and Elizabeth, N. J., respectively.

X Q. 235. How long has the Brill Company been associated with the American Car Company?

(This question and this line of examination is objected to as irrelevant, and motion will be made to strike out the same and tax the costs thereof, unless defendant's counsel before proceeding further will place on record what he expects to be able to prove thereby.)

(At this point defendant's counsel states that the object of pursuing this line of examination is to show to the court that the Brill Company, the complainants in this cause is, as a matter of fact, a virtual trust, having the avowed object of persecuting other companies and interfering with their trade, by bringing suits against said companies and their customers, for purposes of intimidation, to the end that they shall ultimately control the entire truck business of this country, thereby putting an end to or smothering competition.)

(Complainants' counsel objects to the offer and to all testimony taken thereunder as irrelevant and inadmissible, and give notice of a motion to strike out and tax.)

(Complainants' counsel states that there is no evidence that the J. G. Brill Company constitutes anything in the nature of what he calls a "trust," probably meaning a monopoly, except so far as they may be protected in the manufacture and sale of any article by letters patent. Further that the plants of the J. G. Brill Company are merely duplications of plant to meet the natural growth of their business established in different parts of the country for obvious business reasons.)

A. As I have stated before, I do not know in what capacity they are associated, but whatever way it is it has been between two and three years with the American Car Company; less than this time

with the Kuhlman Car Company, and I judge less than a year with the John Stephenson Company.

X Q. 236. Were any of these companies going concerns before their connection or association with the Brill Company?

A. I am unable to answer this question as I have not visited any of these plants.

X Q. 237. The witness apparently mis-understands the preceding question. Were any of these said companies in existence before their association or connection with the Brill Company?

(Same objection.)

A. Yes, I believe they were.

X Q. 238. Were all of them existing companies before such connection or association?

A. Yes.

X Q. 239. Can you state whether or not the Brill Company, or John A. Brill, ever brought suit against any of these companies?

(Same objection.)

A. There was a suit, I believe, brought against the John Stephenson Company. I do not know whether there was any brought against any of the others.

X Q. 240. When was the suit brought against the John Stephenson Company?

(Same objection, and because the witness is not shown to have knowledge of any such suit.)

A. On reconsideration, I cannot state positively whether the suit I have referred to was against the John Stephenson Company or the Brooklyn Heights Railroad Company. This suit was brought, I should judge, about two years ago.

X Q. 241. Did the statement made to you off the record by complainants' counsel, before your last answer, have any effect on your change of answer from that given to cross-question 239?

(Complainants' counsel asks the examiner to note upon the record the words that complainants' counsel spoke aloud in the hearing of the special examiner as now referred to by defendant's counsel.)

(Complainants' counsel states that as the special examiner is not now in the room, and as his deputy, who is now writing out the testimony on the typewriter, is unable to state those words on the record, he will state that at the point indicated, and when the witness was interrogated as to matters about which he could hardly have personal knowledge, he said to the witness, in substance, "Don't testify to anything about which you have not personal knowledge." Complainants' counsel stands ready, if desired, to inform defendant's counsel as to any suits which have been brought against the John Stephenson Company.)

(Defendant's counsel again objects to complainants' counsel testifying in the record as to what he (the witness) "could hardly have personal knowledge" of, and asks that the special examiner instruct

complainants' counsel to desist from conversing or making statements to this witness while on the stand and under cross-examination.)

(Complainants' counsel resents this untrue and unworthy statement of defendant's counsel, and, though unnecessary to say so, states that no outside remarks have been made to the witness which have in any way improperly affected or been intended to affect his testimony on cross-examination. And naturally so, as the cross-examination is deemed to be entirely irrelevant to the issue.)

(In reply, defendant's counsel simply states, as to the untruth of the statement referred to, that it is admitted of record by complainants' counsel that he did make a statement to this witness. As to the unworthiness of the above statement, he is unable to state positively, as he did not hear all of the remark addressed to this witness while on the stand by complainants' counsel. Defendant's counsel again asks that the examination of the witness be allowed to proceed.)

SPECIAL EXAMINER: So far as Mr. Rawle's instructions to the witness are concerned, I think that is a good suggestion that he testify to nothing of which he has no personal knowledge.

(Defendant's counsel again asks the special examiner to read his request and to place upon the record instructions to complainants' counsel as to whether or not it is proper for complainants' counsel to make any statement whatever relating to any question asked while said witness is on the stand for cross-examination.)

(Complainants' counsel objects to the request and any action thereon by the special examiner, for the reason that the special examiner has already ruled upon the record upon the only matter now before him, and that there is no occasion for the special examiner to place upon the record any ruling upon an abstract question which has no pertinency to any matter now before him.)

SPECIAL EXAMINER: In view of the statement made by Mr. Rawle, I deem it unwise at this time to make any further mention concerning the matter.

(Defendant's counsel takes exception to the ruling of the special examiner, inasmuch as complainants' counsel has admitted of record that he did make a statement to the witness while on the stand, the special examiner refusing to rule directly as to the propriety of complainants' counsel making statements to this witness while on the stand for cross-examination.)

A. I cannot answer positively that it did have the effect of causing me to change my answer. The suit I referred to was on account of some cars built by the John Stephenson Company and sold to the Brooklyn Heights Railroad Company, and I am unable to answer as to which of these companies the suit was against.

570 X Q. 242. Then you did hear the statement addressed to you by complainants' counsel, did you?

A. I heard a statement that I was not to testify to anything that I did not have personal knowledge of.

X Q. 243. I call your attention to cross-question 239, and to the answer to this question, and ask you whether or not, after hearing

the statement of complainants' counsel above referred to, you answered cross-question 240 as it appears in the record?

A. Yes.

X Q. 244. Were the cars built by the John Stephenson Company referred to in your answer to cross-question 242 sold to the Brooklyn Heights Railroad Company?

(Same objection as to cross-question 235 and the same notice.)

A. Of this I have no knowledge. The cars were lettered on the outside "Brooklyn Heights" or one of the companies which it controls; they were lettered on the inside of the car "Built by John Stephenson Company."

X Q. 245. How did this suit terminate?

(Same objection.)

A. I have no knowledge.

X Q. 246. Do you know whether or not such suit was carried on to a final judgment?

(Same objections and also because the matter inquired into is not proper for cross-examination.)

A. I do not.

X Q. 247. You say this suit was about two years ago. When did the connection or association of the John Stephenson Company, above referred to, begin with the Brill Company?

(Same objection.)

A. Something less than a year ago; probably about seven or eight months ago.

X Q. 248. Do you know of any other suits brought against the John Stephenson Company or other companies having trucks bearing the marking of this company by the Brill Company?

(Objected to for the same reasons and as being indefinite and unintelligible.)

A. I have no recollection of any other suits.

X Q. 249. Do you know of any suits being brought against the G. C. Kuhlman Car Company, or against any of their customers by the Brill Company?

(Same objection.)

A. No, I do not know of any.

X Q. 250. I ask the same question in reference to the American Car Company.

(Same objection. Defendant's counsel is asked to observe that he does not specify by whom such suits were brought.)

A. No, I do not know of any.

571 X Q. 251. Can you testify positively that suits were not brought against the American Car Company or their customers or against the G. C. Kuhlman Car Company or their customer by John A. Brill or the Brill Company?

(Objected to as irrelevant and inadmissible, and as not proper for cross-examination.)

A. No, I have no recollection whatsoever of any such suits.

X Q. 252. Name some other truck companies operating independently of the Brill Company.

A. The Bemis, Maguire, Taylor, St. Louis, Peckham; that is all I recall at present.

X Q. 253. Do you know whether or not any suits have been brought by John A. Brill or the J. G. Brill Company against any of the companies you have specified in your last answer?

A. There have been suits brought against the Bemis Truck Company, I believe; at least it was a suit in regard to Bemis truck. To the best of my recollection, there has been suit brought against the Peckham Company. I do not recall any suits against the other companies mentioned.

X Q. 254. Do you know whether or not suits are now pending which were brought by John A. Brill or the Brill Company against the Peckham Company?

(Same objection as irrelevant and immaterial and inadmissible, and not proper for cross-examination, also a waste of public time. The same notice to strike out and tax is given.)

A. I cannot tell of my own knowledge.

X Q. 255. Did you not testify in a suit brought by John A. Brill or the Brill Company against the Peckham Company?

A. It is possible I did. I do not recall the particular circumstances at this time.

X Q. 256. Do you know whether or not a suit was brought by John A. Brill against the North Jersey Street Railway Company on the patents now involved in this cause?

(Same objection.)

A. I understand there was.

X Q. 257. Did you not testify for the complainant in that suit?

(Same objection and same notice.)

A. Yes, I did.

X Q. 258. Do you know the determination of that suit?

(Same objection and same notice.)

A. Through hearsay only do I know anything of it.

X Q. 259. What is your understanding of the way it was decided by the United States Circuit Court of Appeals for the Third Circuit?

(Objected to for the same reasons, and because the "understanding" of the witness as to that decision is not evidence of anything, and because that case is *res inter alios acta*. Also, the best evidence of that proceeding lies in proof of the record thereof.)

572 A. My understanding from what I heard was that the Brill Company had not gained their suit.

X Q. 260. Did the North Jersey Street Railway Company use Peckham trucks?

(Same objection and same notice.)

A. Yes.

X Q. 261. Does the defendant in this suit use Peckham trucks?

(Same objection.)

A. Yes.

X Q. 262. Are the same patents involved in this suit as were involved in the suit by John A. Brill against the North Jersey Street Railway Company?

(Same objection.)

A. I understand they are.

Recess.

X Q. 263. In your answer to cross-question 224, you refer to suits brought by John A. Brill or the Brill Company against the Delaware County and Philadelphia Electric Railway Company and the Third Avenue Railway Company of New York City. Do you know the make of trucks used by these companies?

(Same objections.)

A. The Maguire truck was used on the first-named railway and the Bemis truck on the other.

X Q. 264. Which of these companies used the Maguire truck?

(Same objections.)

A. The Delaware County and Philadelphia Electric Railway Company.

X Q. 265. They were customers of the Maguire Truck Company, were they not?

(Same objections, and as useless reiteration.)

A. I do not know whether they obtained them first hand from the Maguire Company or not.

X Q. 266. You have stated that the only truck companies operating in the United States whose names you recall are the Bemis, Maguire, Taylor, St. Louis and Peckham. Do you now recall any others?

(Same objections.)

A. Yes, I can recall two others, the Laconia and the Baltimore Car Wheel Company's trucks.

X Q. 267. Do you know whether or not these companies have ever been sued by John A. Brill or the Brill Company?

(Same objections.)

A. I do not recall any such suits.

X Q. 268. Then, of the independent companies you have named, suits have been brought by John A. Brill or the Brill Company against the Bemis Company, the Maguire Company and the Peckham; or if not against these companies against other companies using their trucks; is that correct?



573 (Same objections.)

A. Yes, that is correct; there was no suit, as I understand it, against the Maguire Company, but against the railway company that used their truck.

X Q. 269. Do semi-elliptic springs, arranged in the support of a bolster of a truck, ever perform the function of rigid equalizer bars, arranged in the support of a bolster of a truck, in so far as the equalization of the weight of said bolster and a car body supported thereon is concerned?

(Complainants' counsel, the above line now having been ended, now repeats his objections, as above.)

A. Yes, they perform the same functions as the rigid equalizer bars, and perform additional functions also.

X Q. 270. In so far as the equalizing action or effect is concerned, their action is identical, is it not?

A. The semi-elliptic spring in a truck allows more freedom for equalization than the rigid bar—I refer to the Brill type of trucks in my last two answers.

X Q. 271. Omitting any reference to the Brill trucks, would not the load be distributed or equalized by the semi-elliptic springs be distributed or equalized in the same manner by rigid equalizer bars?

(Objected to as not showing what construction of trucks is intended to be covered by the question.)

A. I cannot give an answer that will cover all styles of trucks to this question.

X Q. 272. Do you know of any truck construction wherein rigid equalizer bars or semi-elliptic springs have been or may be used to perform substantially the same functions, in so far as the equalization of the load is concerned?

A. I have known trucks to be made that have what are termed equalizing bars running from axle box to axle box lengthwise of the truck. I have also known other trucks where equalizing bars ran transversely of the trucks and were not connected to the axle boxes, and I have known other trucks that have equalizing bars running lengthwise of the trucks and not resting on the axle boxes. Possibly in some of the cases I have mentioned either rigid equalizing bars or semi-elliptic springs could be used advantageously.

X Q. 273. Have you, as an expert mechanic, skilled in the truck art, ever considered rigid equalizer bars and semi-elliptic springs equivalents, in so far as the equalization of the load is concerned?

A. As stated above, I consider that it is probably possible to make them equivalents, but in view of no truck structure being mentioned, it is impossible to say further.

X Q. 274. Have you ever designed a truck in which rigid equalizer bars or semi-elliptic springs could be equally well used to perform the function of equalizing the load?

A. No, I do not recall doing so.

574 X Q. 275. Then, as far as you remember, you do not recall of ever having devised a truck in which you have employed or stated that you could employ equalizer bars or semi-elliptic springs as equivalents; is that correct?

A. Does "devise" mean invent or work out detail?

X Q. 276. You may put either interpretation upon the word "devise" for the purposes of this answer.

A. I have worked out trucks having rigid equalizing bars; I have also worked out other trucks of a different type, using semi-elliptic springs that performed the same functions and additional ones to those performed by the rigid equalizers.

X Q. 277. Have you ever considered rigid equalizer bars and semi-elliptic springs equivalents in the same or substantially the same construction of truck?

A. If semi-elliptic springs are used, it is necessarily a different construction of truck than if rigid bars were used. I have previously stated that it is possible, I believe, to make them act as equivalents with additional functions in favor of the semi-elliptic springs.

X Q. 278. You have taken out several United States Letters Patent, have you not?

A. Yes.

X Q. 279. Are you the Walter S. Adams mentioned in the United States Patent to W. S. Adams, No. 637,544, patented November 21, 1899, for a pivotal car truck?

(Objected to as irrelevant and immaterial and inadmissible, and not proper cross-examination.)

A. Yes, I am the same.

X Q. 280. Will you describe briefly the construction of this truck?

(Same objection.)

A. This is a truck having a frame resting on springs over axle boxes with equalizing spring bands resting on top of side bar of frame near the axle boxes, said equalizing bands supporting spiral springs under the side bar, which springs in turn support an equalizing bar, a spring plank being bolted to the center of the equalizing bar, triple elliptic springs resting on spring planks, and supporting the truck bolster on which the car rests.

X Q. 281. Does that description apply to Fig. 11?

(Same objection.)

A. Fig. 11, the same description will apply as far as the truck frame, the equalizing spring links, the equalizing springs. In Fig. 11 the equalizing springs support the semi-elliptic springs, which in turn at their center support the truck bolster by means of a pedestal casting which passes up on either side of the side bar.

X Q. 282. In so far as the equalizing effect of the load of the bolster which supports the car body is concerned, does the semi-elliptic spring shown in Fig. 11 of this patent perform substantially the same function as equalizer bar 13 shown in Fig. 1?

(Same objection.)

A. It performs the same functions, and also additional functions.

575 X Q. 283. I quote from the above patent:

"My invention has relation to the class of truck *in which an equalizing bar, either in the form of a rigid and inflexible bar or a longitudinally disposed semi-elliptic spring, is utilized for the purpose of suspending the bolster from the truck frame in connection with links supported from the bars of the truck frame in which link springs have been employed.*" [The italics are mine.]

Do you find such a statement in the above patent, in which you appear as the inventor?

(Objected to as irrelevant and inadmissible; also as not proper for cross-examination and as relating to an instrument which is not in evidence in this cause.)

A. Yes.

DEFENDANT'S COUNSEL: I offer in evidence patent to Adams, No. 637,544, patented November 21, 1899, for Pivotal Car Trucks, and mark the same "Defendant's Exhibit, Adams 1899 Patent."

(The offer is objected to as irrelevant and inadmissible; also as not proper for cross-examination and as being out of order, the defendant's case having been closed. Motion will be made to strike the same from the record.)

X Q. 284. I quote the following from this patent:

"The constructions to which these improvements have special relation will be found in the patents to *Brill and Curwen, Nos. 610,118 and 610,119, dated August 30, 1898, and also in the application for patent filed by George Martin Brill, on the 3d day of July, 1897, Serial No. 643,339, Patent No. 627,898, dated June 27, 1899.*" [Italics mine.]

Did you make such a statement in this patent?

(Same objection.)

A. Yes.

X Q. 285. I quote the following:

"The construction shown in Figs. 11 and 12 may be employed in many cases where the previously described construction, by reason of cost or otherwise, may be undesirable, the semi-elliptic springs 13a not only taking the place of the usual bolster springs, but that of the equalizing bars 13 as well."

Do you use this statement in describing your invention in the above-mentioned patent?

(Same objections.)

A. Yes.

X Q. 283. I quote the following from the above-mentioned patent to Adams:

576 "I desire to be understood that where the word 'equalizer' or equivalent expression is employed in the claims, either the equalizing bars, the semi-elliptic springs or other equivalent construction is included therein."

Did you use the above-quoted statement in your patent above referred to?

(Same objections.)

A. Yea.

X Q. 287. Then by the term "equalizer," as used in this patent you included either equalizing bars or semi-elliptic springs, did you not?

(Same objections.)

A. Yes, if the semi-elliptic springs were used, they not only took the place of the rigid equalizing bars, but the usual bolster springs as well.

X Q. 288. What kind of a hanger is used in this patent to suspend the spiral springs from the side bar of the truck?

(Same objections.)

A. Where the rigid equalizing bar is used, the hanger is made of a rectangular bar; where the semi-elliptic spring is used, the hanger is made of a rectangular bar, except at the top, where it rests on the side bar, it is curved to allow for the elongation of the semi-elliptic spring. In both cases mentioned these hangers are supported on top of the side bar so as to allow a movement transversely of the truck.

X Q. 289. I call your attention to Fig. 12 of this patent. Does the part which you describe as a bar comprise, as a matter of fact, what is known as a strap hanger?

(Same objections.)

A. Yea.

X Q. 290. Have trucks been made by the Brill Company in substantial accordance with the drawing and specification of this patent?

(Objected to as irrelevant and inadmissible and as not proper for cross-examination.)

A. Trucks have been made in accordance with Figs. 1 to 10 inclusive; none have been made like Figs. 11 and 12, that is following the construction shown in those figures.

X Q. 291. Are such trucks now being put out by the Brill Company?

(Same objections.)

A. Substantially as shown in Figs. 1 to 10 inclusive, yes.

X Q. 292. Under what term or trade designation are such trucks put out?

(Same objections.)

A. 27-A and 27-E.

X Q. 293. Is this truck or could this truck be termed a good-selling truck?

(Same objections.)

A. Yes, a fairly good-selling truck; it is a high-speed truck, therefore it is rather an expensive one.

X Q. 294. How many of these trucks have been sold by the Brill Company, according to the best of your knowledge?

(Same objections.)

A. Answering from memory, I would say between 2000 and 3000.

577 X Q. 295. Have 27-G trucks bearing patent plates indicating that they are made under letters patent 627,898 and 627,900, or either of these numbers, and having also on said plate the marking of this patent No. 637,544, been put out by the Brill Company?

(Same objections.)

A. I think so, with the possible exception of 627,900.

X Q. 296. Can you not state positively that 27-G trucks bearing patent plates indicating that they are made under United States Patent 627,898, and also having thereon the number 637,544, have been put out by the Brill Company?

(Same objections.)

A. I have every reason to believe that these two patent numbers are on the plate referred to and every reason to believe that I ordered the dates put on the patent plates by the pattern maker.

X Q. 297. Do you not know positively that the numbers referred to in cross-question 296 appear on the plate of the 27-G trucks put out by the Brill Company?

(Same objections.)

A. Not having one of these patent plates before me, I cannot answer any more positively than I have done.

X Q. 298. Are you familiar with the 27-G truck put out by the Brill Company?

A. I am.

X Q. 299. Then you state, to the best of your knowledge and recollection, the numbers 627,898, this being the number of the parent patent in suit, and your patent No. 637,544, both appear on the 27-G trucks put out by the Brill Company; is that correct?

(Same objections.)

A. For the answer I refer to my answer to cross-question 296 and cross-question 297.

X Q. 300. What other strap hanger trucks are put out by the Brill Company? I refer for identification to the trade term or designation.

(Same objections.)

A. I do not understand the reference to strap hanger trucks, as to whether it means with strap hangers like I have previously testified to or not.

X Q. 301. I refer to the strap hangers interposed in the support of equalizer bars or semi-elliptic springs from the side bars of the

truck; said equalizer bars or semi-elliptic springs, as the case may be, being in turn interposed in the support of the bolster.

(Same objections.)

A. The Brill 27-F truck has the equalizing bar supported in precisely the same manner as the Brill 27-A and E trucks referred to. The Brill 27-C, D and E trucks have a strap hanger that is supported from the side bar by means of an equalizing spring bolt. The Brill 27-G truck has a strap hanger that is supported from the side bar by means of an equalizing spring bolt; it also has a strap hanger supported from the top of the side bar, which in turn supports a spiral spring, and which spiral spring supports a semi-elliptic spring.

578 X Q. 302. Referring to the above question, please state, giving the trade term or designation, what trucks are put out by the Brill Company having the strap hangers extending over the side bars and interposed in the support of equalizing bars or semi-elliptic springs which, in turn, are interposed in support of the bolster?

(Same objections.)

A. The 27-A, 27-E and 27-F have the straps over the side bars by which means the equalizing bars, which are rigid, are supported. Neither of these types of trucks ever had a semi-elliptic spring used in connection with them, as described. Some of the 27-G trucks have a strap hanger over the side bar by which the semi-elliptic springs are supported from the side bar by means of a spiral spring and an equalizing spring bolt. These hangers, in some of the 27-Gs referred to, are constructed differently from the straps used in the 27-A, E and F trucks.

X Q. 303. What other trucks are put out by the Brill Company, according to the best of your recollection, bearing thereon the marking of your patent No. 637,544?

(Same objections.)

A. Some of the later types of A, E and F. I will state here that all of the 27-A and E trucks were not made with the strap over the side bar.

X Q. 304. Are 27-A and 27-E trucks still being manufactured and put out by the Brill Company?

(Same objections.)

A. Yes.

X Q. 305. Are 27-G trucks bearing patent plates, indicating that they are made under U. S. Patent 627,898, this being the parent patent in suit, and having thereon the number of your patent 637,544, according to the best of your recollection, being put out at the present time by the Brill Company?

(Same objections.)

A. The 27-G trucks are still being put out by the J. G. Brill Company. In reference to the dates on the patent plates, I cannot give any further answer than I have already done three times before.

X Q. 303. I did not refer to dates; I referred to numbers.

(Same objections, and because the patent law requires patent dates and not patent numbers to be put on the article.)

A. In my answer to cross-question 303, I should have referred to the dates on the patent plates of the patents referred to.

X Q. 307. On the patent plates referred to, appearing on the 27-G trucks, as put out by the J. G. Brill Company, do the dates of June 27, 1899, this being the date of the parent patent in suit, and the date of your patent No. 21, 1899, appear according to the best of your recollection?

(Same objections.)

579 A. In answer to cross-question 296, I stated I had "every reason to believe that I ordered the dates put on the plates by the pattern maker."

X Q. 308. Your answer to cross-question 296, was not responsive to my question. I referred therein to No. 627,898, the number of the parent patent in suit and your patent No. 637,544. I ask you now if such numbers do not, as a matter of fact, appear on the patent plate borne on the 27-G trucks put out by the Brill Company?

(Same objections.)

A. As the J. G. Brill Company do not put the numbers of patents on their patent plates, but the dates, all my answers to these patents refer to their dates entirely.

X Q. 309. Do they refer to the dates of patent 627,898, the parent patent in suit, and your patent No. 637,544?

(Same objections.)

A. My answer to cross-question 297 states: "Not having one of these patent plates before me, I cannot answer any more positively than I have done."

X Q. 310. I refer to the answer to the question, cross-question 296, and substitute for the numbers of the respective patents stated therein the dates of these patents respectively. With this substitution, is your answer to cross-question 296 substantially correct?

(Same objections.)

A. Yes.

X Q. 311. Who paid the expenses of prosecution before the Patent Office of your application which eventuated in the patent 637,544?

(Same objections.)

A. I presume the J. G. Brill Company.

X Q. 312. You did not pay such expenses, did you?

(Same objections.)

A. No.

X Q. 313. Have trucks made in accordance with patents to Brill



and Curwen No. 610,118 and 610,119, or either of them, been manufactured and put out by the Brill Company?

(Objected to as irrelevant and inadmissible, and not proper for cross-examination.)

A. Yes.

X Q. 314. Trucks made in accordance with both of said patents?

(Same objections.)

A. Yes.

X Q. 315. What were the numbers or trade designation given to the trucks made in accordance with the Brill and Curwen patent?

(Same objections.)

A. They are known as the 27-A trucks; previous to designating them by letter, they were known as No. 27 trucks.

X Q. 316. Do you know whether or not the dates of these patents appear on the patent plates borne on the 27-G trucks?

A. I do not think they do.

580 X Q. 317. How many trucks, made in accordance with the Brill and Curwen patent, have been manufactured and sold by the J. G. Brill Company, according to the best of your recollection?

(Same objections.)

A. Answering from memory, I would state between 2000 and 3000; possibly exceeds 3000.

X Q. 318. Are 27 or 27-A trucks built under the Brill and Curwen patent, being put out by the Brill Company at the present time?

(Same objections.)

A. Yes, I believe they are built under the Brill and Curwen patent.

X Q. 319. Are such trucks good-selling trucks?

A. Yes; they are high-speed trucks and they are rather expensive; but a number of them are sold.

X Q. 320. You consider these 27, or as they are now considered 27-A trucks, a practical and successful truck?

A. Very much so.

X Q. 321. Are these trucks above referred to built with a long or short wheel base?

A. The trucks built under Brill and Curwen patents Nos. 610,118 and 610,119 are not what are termed short wheel base trucks, as they have the motors mounted within the wheel-base.

X Q. 322. Do you know Samuel M. Curwen?

A. I do.

X Q. 323. Is he one of the joint inventors of the patent referred to?

A. I know the Samuel M. Curwen referred to in the said patent.

X Q. 324. You know him to be one of the joint inventors of said



patent, and is he the same Samuel M. Curwen who was employed by the J. G. Brill Company in 1902?

A. I know him to be the joint inventor and the same one employed by the J. G. Brill Company in 1902.

X Q. 325. Do you disagree with the following excerpt which I quote from the Transcript of Record for the United States Circuit Court of Appeals for the Third Circuit in the case of the North Jersey Street Railway Company, Appellant, against John A. Brill, and published by the Clerk of the Court, such excerpt being a part of the deposition of Samuel M. Curwen, an employee of the Brill Company in 1902:

"X Q. 38. Are these 27 trucks built with what you term a short wheel base?

A. They are."

(Objected to as inadmissible and irrelevant; also as not proper for cross-examination; also because the quoted matter in the question was taken from a paper or document which is not in evidence in this cause.)

A. I cannot state whether I agree or disagree, for the reason the quotation given does not state what trucks were referred to, except No. 27 truck, which at that period was a general application, more or less, to the trucks that are now marked with a letter after the number 27. Before I can answer it will be necessary for me to read his testimony.

581 X Q. 326. Have you not stated heretofore in the record that the first number or designation given the Brill and Curwen truck, as put out by the J. G. Brill Company, was the number 27?

A. I have so stated.

X Q. 327. Did such number indicate any other style of truck?

A. It indicated or was referred to frequently for the various types that now have letters to designate them.

X Q. 328. Did No. 27 originally designate a truck made in accordance with the patents to Brill and Curwen?

(Objected to as inadmissible and as not proper cross-examination.)

A. It did.

X Q. 329. Then referring to this No. 27 truck as a Brill and Curwen truck, do you disagree with the quoted excerpt referred to in cross-question 325?

(Same objection as to cross-question 325, and further, because the alleged statement of another witness cannot be brought into this record by any such means; and further, because quoting from document, without putting the entire document in evidence, is irregular and inadmissible.)

A. As I have stated before, I do not know whether Mr. Curwen was referring to a Brill and Curwen truck, and therefore cannot answer as to whether I agree or disagree without reading his testimony.

X Q. 330. Assuming for the purposes of this question that a Brill and Curwen truck was referred to, do you disagree with the excerpt, whether made by Mr. Curwen or not, appearing in cross-question 38?

(Objected to for the same reasons and for the obvious reason that the witness is asked to assume, in answering the question, what someone else had in his mind in making an alleged statement.)

A. If the question refers to Brill and Curwen patents No. 610,118 and 610,119, as shown in these patents, these are not what I term short wheel base trucks, and not what is known to the trade as such.

Adjourned to meet at this place at 11.15 o'clock A. M. on Tuesday, July 18, 1905.

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POST OFFICE BUILDING,  
PHILADELPHIA, July, 18, 1905.

Met pursuant to adjournment.

Present: Samuel Bell, Esq., Special Examiner; Francis Rawle, Esq., for Complainants; Warfield & Duell, for Defendant.

Cross-examination of Mr. ADAMS continued:

X Q. 331. Since the last session, have you read any of the testimony of the preceding witnesses in this case?

A. No, I have not.

X Q. 332. Have you read the testimony given by Mr. Curwen in the North Jersey case?

(Objected to as irrelevant and inadmissible, and as not proper for cross-examination, and because the said record is not in evidence in this cause.)

A. I have no recollection of having read it.

X Q. 333. How many plates or leaves are there in the semi-elliptic springs of the Brill truck as put out?

A. There are various numbers of leaves due to the thickness that may be used, and also to the weight of the cars they are to be used under.

X Q. 334. How many plates or leaves are employed in the Brill 27-G truck on the semi-elliptic springs?

A. There are different numbers, according to the thickness of the plates and to the weight of the car that is to be used on them.

X Q. 335. Are there any 27-G Brill trucks used in Philadelphia?

A. There are.

X Q. 336. Do you know how many plates are employed in the semi-elliptic springs of the Brill 27-G trucks, used in Philadelphia?

A. My recollection is that some of them have six plates, some of them seven, some eight, and possibly nine, plates in them.

X Q. 337. Can you name any other makes of pivotal center-bearing short wheel base trucks having wheels all of the same diameter?

A. The Peckham, the Curtis and the Taylor are all I can bring to mind at the present time.

X Q. 338. I call your attention to "Defendant's Exhibit, Buck 1871 Patent." Is provision made between the side bars of this truck and the ends of the bolster to allow a lateral swing or a swing transversely of the truck of said bolster?

A. There is a space between the end of the bolster and the side frame of the truck that would allow for transverse swing.

X Q. 339. As shown in this patent, upon what is the bolster mounted?

583 A. Upon semi-elliptic springs.

X Q. 340 How are these springs arranged with respect to the ends of the bolster?

A. They are fastened to the semi-elliptic springs near the ends of the bolster.

X Q. 341. To what are the semi-elliptic springs referred to connected?

A. They are connected to so-called springs R Q, which run across the truck transversely.

X Q. 342. What means are employed in making this connection?

A. A shackle or clevis connecting these at their ends.

X Q. 343. Upon what are the semi-elliptic springs which extend transversely of the truck supported?

A. These which I have referred to as R Q are supported at their centers in the center of the truck from the cross timbers D.

X Q. 344. Upon what are the trucks you refer to as cross timbers supported?

A. From the side bars.

X Q. 345. As shown in this patent, is a transverse or lateral swing provided for the semi-elliptic springs O and P by means of the shackles connecting them with the semi-elliptic springs Q and R?

A. The top of the top shackle *r* is in contact with the under side of cross timbers D. In view of the friction that would ensue at this point, it would retard if not totally destroy the transverse swing through the shackles.

X Q. 346. Then, as you understand this construction, if it were not for this frictional engagement of the shackles R, with the parts you term cross timbers, the semi-elliptic springs O and P would have a lateral or transverse swing by means of the shackle connections between the semi-elliptic springs Q and R, would they not?

A. Providing the shackle *r* is pivotally supported on the ends of the semi-elliptic springs R and Q, which is not clearly shown in the drawing in the patent.

X Q. 347. Assuming that the ends of the springs Q and R are out of engagement with the parts you term the cross timbers of the truck, could the semi-elliptic springs O and P swing freely transversely of the truck?

A. Yes, I consider they could, providing they were pivoted, as I stated before, on the ends of the springs R and Q.

X Q. 348. I call your attention to "Complainants' Exhibit, Model Buck Truck," which you state is made in accordance with the draw-

ings and specifications of this Buck patent. What connection is provided for the upper shackle, forming a part of the connection between the longitudinally extending semi-elliptic springs and the semi-elliptic springs extending transversely of the truck?

A. The upper shackle is connected to the ends of the transverse semi-elliptic springs by a pin or bolt running through an eye in the ends of these springs.

584 X Q. 349. Is this what may be termed a pivotal connection?

A. It is a pivotal connection, but the top of these shackles in the model is in contact with the cross timber, which practically destroyed their capacity to swing.

X Q. 350. Then as you understand the construction shown and described in this patent a pivotal connection is provided for the upper shackles *r* with the transversely extending semi-elliptic springs; is that correct?

A. In my opinion, this was intended.

X Q. 351. In your opinion, would the friction between the upper shackles *r* and the parts termed by you the cross timbers of the truck absolutely prevent a lateral swing of the longitudinally extending semi-elliptic springs, or would such swing be simply hindered or retarded?

A. It would not absolutely prevent the movement of the shackles, but for all practical purposes it would be useless.

X Q. 352. If the ends of the semi-elliptic springs Q and R are out of engagement with the parts you term cross timbers, assuming that the shackles *r* are pivotally connected with said springs, as shown in said patent, and in "Complainants' Exhibit, Model Buck Truck," then the longitudinally extending semi-elliptic springs O and P are permitted a free transverse swing, are they not?

(Objected to, because the patent shows the transverse semi-elliptic springs in constant contact with the cross timbers, except under extraordinary circumstances.)

(Objection is objected to, on the ground that it involves an attempt of complainants' counsel to testify in the record.)

A. Under the conditions named in the question, the springs O and P would be free to swing.

X Q. 353. Assuming that the semi-elliptic springs Q and R have their ends disengaged from the parts you call the cross timbers of the truck, then the longitudinally extending semi-elliptic springs O and P are resiliently supported from said cross timbers, are they not?

(Same objection.)

A. Under such conditions they would be for a moment of time. As the transverse springs Q and R are pivotally supported at their centers, the car would set up a continual rocking motion, with first one end and then the other end of the springs Q and R coming in contact with cross timbers D. This rocking motion would be caused

by the necessarily uneven loading of the car and the inequalities of the track.

X Q. 354. Then, when the semi-elliptic springs Q and R are out of engagement at their ends with the cross timbers, the semi-elliptic springs O and P are movably and resiliently suspended from said cross timbers, are they not?

(Same objection, and as useless reiteration.)

A. As stated in my last answer, I consider that one end of the springs Q R would always be in contact with cross timber D. My answer is that under such circumstances one of the springs  
585 O P could be resiliently supported, but not both of them at the same time, except possibly for a very brief moment of time.

X Q. 355. Leaving your opinion out of the question, and assuming the condition specified in cross-question 354 to exist, the semi-elliptic springs O and P would be movably and resiliently suspended from the cross timbers, would they not?

(Same objections, and because the whole inquiry is as to the opinion of the witness.)

A. My answer to cross-question 354 expresses my belief, opinion and observation, according to my experience.

X Q. 356. Please state again, assuming that the semi-elliptic springs Q and R have their ends out of engagement with the cross timbers of the truck, whether or not the semi-elliptic springs O and P will be movably and resiliently suspended from said cross timbers?

(Same objections as previously made.)

A. In view of the copy of the 1871 Buck patent that is before me, and also "Complainants' Exhibit, Model of Buck Truck," the condition in the question could not exist in this truck in operation. As a theoretical question merely, I will answer that if both ends of springs Q R were disengaged from cross timbers D springs O P would be movably and resiliently supported.

X Q. 357. The semi-elliptic springs Q and R would not, in fact, operate as springs when both ends of said springs are in engagement with the part you term cross timbers, would they?

A. They would not.

X Q. 358. Then, the only times when the springs Q and R would, as a matter of fact, act as springs would be when they are out of engagement with the parts you term cross timbers; is that correct?

A. Yes.

X Q. 359. When the springs Q and R are out of contact with the cross timbers, such springs then have a spring action, do they not?

A. Yes.

X Q. 360. I call your attention to "Defendant's Exhibit, Buck 1871 Patent," and to the following excerpt from this patent:

"The bolster has constant and free capacity for swing motion on the shackle connection of the springs and spring motion on the springs O P and the equalizer springs G."

Do you find this statement in said patent?

A. I do.

X Q. 361. I call your attention to the following, which I quote from "Defendant's Exhibit, Buck 1871 Patent":

"The upward movement of the wheel in passing over an inequality of the track first raises the end of the equalizer bar resting on the journal box; the strain then comes on the spring G, which is preferably located vertically beneath the end of the intermediate cross tie D or D', which end may be raised, but never to the same extent as the wheel, and still decreased movement of the spring step S is caused.

"This step turns freely on its supporting pivot pin T, so that there is no racking strain on the attachments, and as one end of the tie is raised the spring Q or R is raised equally at both ends, and but a slight and equal movement is communicated to the springs O P, and in a still decreased extent to the bolster."

Do you find the above quoted matter in the specification of this patent?

A. I do.

X Q. 362. To what does the part designated by S, described in this patent, refer?

A. This refers to what is termed in the patent "spring step" on which springs R Q rest.

X Q. 363. Upon what and how is the spring step S mounted?

A. It is mounted upon the bolt T, which in turn is supported by the hanger straps U which are fastened to the cross timber G.

X Q. 364. Does the specification describe this spring step S as being pivotally supported?

A. Yes.

X Q. 365. Do you note anywhere in the specification of this patent a statement to the effect that "this step turns freely on its supporting pivot pin T"?

A. It so states in the specification; this turning can only be effected when the springs R Q comes into action which this specification states "having sufficient flexibility to be brought into use as springs on any extraordinary occasions."

X Q. 366. Does the upper surface of the spring step S closely fit the lower surface of the bottom plate or leaf of the semi-elliptic springs Q or R?

A. Yes.

X Q. 367. In your opinion, could the spring step S turn freely upon the pivot T, as described in this patent, unless the semi-elliptic spring supported thereby had both of its ends out of engagement with its respective cross timber?

A. By the action of this spring step turning on the pivot, it would cause the car to rock, and the only restraint to the turning of this spring step S would be the tops of the semi-elliptic springs R Q striking the cross timbers D, as I have previously described.

X Q. 368. I ask you to again observe cross-question 367, and give, if you can, an answer responsive thereto, without attempting to evade the question.

A. No, it could not turn unless both ends were out of contact with the cross timber, one end of which would be out of contact a moment of time, as by the spring step turning on the pin it would allow first one end and then the other of the springs Q R to strike the under side of cross timbers D.

X Q. 369. I call your attention to "Defendant's Exhibit, Overbagh Patent"; how is the equalizing bar D supported in this patent?

587 A. One end is supported from the journal box, the other end is supported from a bolt that runs up through the side frame of the truck and is supported on a spring or rubber cushion.

X Q. 370. Do you find any authority in the drawings or specifications of said patent for your answer to question 65, in which you state that the equalizer D has a flat support on the top of the journal box equal to the thickness of the equalizing bars?

A. To make that answer clearer I will qualify it as follows: The equalizing bar rests on a V-shaped piece on top of the journal box; the length of this V-shaped piece which the equalizing bar rests on is equivalent to the thickness of the equalizing bar. This was and is, to a great extent, general practice.

X Q. 371. Do you find the V-shaped piece you refer to described in the specification of this patent?

A. No, I do not find it described.

X Q. 372. Is such a V-shaped piece shown in the drawings of this patent?

A. One view of this V-shaped piece is shown.

X Q. 373. What do you understand by the term "fulcrum," as applied to the springs E?

A. I understand this refers to what I presume are rubber springs, which rest on the equalizing bars and support the sides of the truck frame.

X Q. 374. What do you understand the meaning of the word "fulcrum" to be?

A. In a lever the fulcrum is the fixed point.

X Q. 375. Is it the fixed point about which the lever turns?

A. Yes.

X Q. 376. What do you understand the meaning of this word to be as applied to the springs E, as shown in this patent?

A. It partly refers to the spring resting on the equalizing bar, which in relation to the truck is the most constant to any other part of the truck that rests on this spring E.

Recess.

X Q. 377. Referring again to this patent, is not the spring E described as being the fulcrum for the equalizing bar D?

A. The spring E rests on the equalizing bar, and I consider any virtue it has for acting in the capacity of a fulcrum is due to the fact of its resting on the equalizing bar.

X Q. 378. Do you find this paragraph which I quote in the specification of this patent?

"The gum or other spring E, being the fulcrum for its bar D, can



be set at such point in the radius as will best promote the riding of the car, and the use of the springs."

A. I do.

X Q. 379. Is the spring E described in this paragraph as being a fulcrum for its bar D?

588 A. It is so described.

X Q. 380. Are the equalizer bars D resiliently supported from the side frame of the truck?

A. One end of the equalizer may be termed so, the other end not so.

X Q. 381. I call your attention to "Defendant's Exhibit, Thyng Patent." How is the bolster supported in this patent?

A. It is supported on a semi-elliptic spring, which in turn is supported from the side frame of the truck.

X Q. 382. What means are employed to connect the ends of the semi-elliptic springs with the side frames of the truck?

A. Shackles or links.

X Q. 383. Is a transverse motion or swing provided for the bolster, as disclosed in this patent?

A. There is, under certain conditions; but I do not consider there is under all conditions that a truck of this kind would be subjected to in service.

X Q. 384. Please explain under what conditions the bolster employed in the truck disclosed in this patent, in so far as it is illustrated and described in this patent, would not have a transverse movement or swing.

(Complainants' counsel asks defendant's counsel to state on the record the precise designation and mark of the exhibit to which he calls the witness's attention.)

(Defendant's counsel states that he refers to "Defendant's Exhibit, Thyng 1845 Patent.")

A. This patent shows the links or shackles in such a way that a truck under a car with its maximum load would flatten the springs sufficiently to cause these links to bind against their surfaces and on their supporting pins to such an extent that it would retard or wholly destroy any transverse swing.

X Q. 385. As shown in said patent, is there anything to prevent the transverse movement of the swing or bolster?

A. As shown in the said patent, the only thing that I consider would restrain the side movement would be the contact of the upper side of the bolster against the under side of the truck frame. If this were free at this point, I consider it would be free to swing transversely, as shown in the patent.

X Q. 386. I call your attention to "Defendant's Exhibit, Beach Patent." Are the hangers H in this patent described as being free to vibrate or oscillate in any direction?

A. There is a reference made to the springs and their hangers being free to vibrate or oscillate in any direction; but if they are made in accordance with the drawings in this patent, they will not work so.

X Q. 387. I quote the following from this patent:



"The invention consists, first, in the peculiar construction of the truck frame proper; secondly, in the peculiar construction of  
589 the springs in such a manner that their hangers are free to vibrate or oscillate in any direction."

Do you find the above matter set forth in the specification of the above patent.

A. Yes.

X Q. 388. Admitting the truth of the above-quoted statement, is the bolster in this patent movably and resiliently supported from the truck frame?

(Objected to, as the question neither asks the witness to testify as to the words quoted, nor asks him to testify as to the structure shown in the patent, but asks a composite and inconsistent question, which is incapable of being answered.)

A. If the above statement is true, the bolster is movably and resiliently supported from the truck frame, but it is not disclosed in the drawing of this patent how this can be accomplished.

X Q. 389. Does the pin *d* pass loosely through the eye of hanger H, as disclosed in Fig. 7 of this patent?

A. The drawing in Fig. 7 shows one line for the opening in the hanger H, and also for the outline of the pin, with the exception that at the bottom of the pin, where there are two lines indicating a small space. This line would therefore show that the pin passes through neatly and not loosely.

X Q. 390. In order to make hanger H capable of a free vibration or oscillation, on the pin *d*, would it, in your opinion, be within the skill of a mechanic to make the eye of said hanger of larger diameter than the diameter of said pin?

A. The pin referred to is one with flat sides, and it cannot be referred to as having a diameter. If the hanger H had a large hole in it—which, however is not shown in the patent—this would probably allow some movement, if it did not come in contact with the sides of the hole in the flange G'.

X Q. 391. Is the construction described in this patent such that the truck is free to swing laterally, and to accommodate itself to inequalities in the track, without communicating such motions to the body of the car, or, at most, to a very small extent, doing away with the concussive gauge motion experienced where the car body is rigidly swiveled to the "truck by a king bolt and center-bearing"?

A. This is so stated in the specification, but is not disclosed in the drawing of this patent.

X Q. 392. Are the hangers H in this Beach patent shown suspended by means of spiral springs from the truck frame?

A. The truck hangers and springs referred to are supported in part by the truck sides and the truck transoms, which connect the sides.

X Q. 393. Are the spiral springs interposed in the support of the bolster from the truck frame?

A. I do not find any truck bolster referred to in the patent. D'

is supported from the truck frame, but it is called a transom, and it is fastened rigidly to the car body parts.

590 X Q. 394. Is the part designated in the patent as the transom E' supported through the medium of the spiral springs and the hangers H from the truck frame?

A. Yes, it is.

X Q. 395. Referring again to "Defendant's Exhibit, Thyng 1845 Patent," would it occur to you as a mechanic skilled in this art that if it were desired to allow for the splay of the semi-elliptic springs E, such splay could be allowed for by providing an additional joint in the connections between the said springs and the side bars of the truck?

A. I am the patentee of one of the patents set up by the defendant in this suit, which is patent 538,858. I realize the desirability of combining the transverse movement of the bolster and also provide the longitudinal movement on account of the elongation of the semi-elliptic spring. It certainly did not occur to me to make these two movements, notwithstanding that I knew it was very desirable to combine them in the same truck. As to whether it would occur to me, the best evidence is, as stated above, that it did not. If another joint were put in the link at the proper place, I consider the splay of the springs could be taken care of.

X Q. 396. How did you provide for the splay of the semi-elliptic springs E in your 1895 patent?

A. By supporting them on links G, which have their pins running at right angles to the length of the semi-elliptic springs.

X Q. 397. Was that before the dates of either of these patents in suit?

A. Yes, the date of this patent is before those in this suit.

X Q. 398. If the splay of the semi-elliptic springs, "Defendant's Exhibit, Thyng 1845 Patent," were provided for by an additional joint between the connections of said springs and the side frames of the truck, would not then the strain on the shackles be relieved?

A. If this joint were put in the proper place, it would provide for the splay of the semi-elliptic springs.

X Q. 399. Having the structure illustrated in "Defendant's Exhibit, Thyng 1845 Patent" before you, if it were desired to provide additional resiliency to the bolster, would it occur to you, as a mechanic skilled in this art and having knowledge of the structures illustrated in "Defendant's Exhibit, Overbagh 1870 Patent" or "Defendant's Exhibit, Beach 1876 Patent," that such resiliency could be provided by combining the shackles of this said Thyng patent with the bolt *a* of the Overbagh patent or the hanger H of the Beach patent?

(Objected to as irrelevant and as tending only to show what might be termed piecemeal evidence.)

A. I do not know that it would occur to me, and I do not know that it ever occurred to anyone to do such a thing, as I never saw a truck so constructed by making the substitution referred to.

X Q. 400. In your opinion, would either of the combinations referred to in the preceding question be mechanically possible?

A. It would be possible to make such a combination, but neither one of them would be mechanically operative as to the free movement of the semi-elliptic springs transversely and longitudinally of the truck any more than as disclosed in the Thyng 1845 patent.

X Q. 401. Would such combination interfere with the transverse movement of the bolster?

A. If the bolt *a* in the Overbagh patent were used, the condition as to transverse movement would be the same as shown in the Thyng patent without this substitution; that is, had the spring flattened, it would put a strain on the shackle bar links which would cause them to bind sufficiently to retard, if not wholly destroy, their capacity to swing transversely.

If the links and springs, as shown in the Beach patent were used, it would require making the truck frame considerably wider, thereby making more overhang on the axles than shown in the Thyng patent. The side frame of the Thyng truck would also have to be enlarged to allow the hole for the link *H* and the barrel *G* shown in this Beach patent. As this link *H* is not provided with a capacity to swing transversely of the truck, if used in connection with the Thyng patent the eye through which the pin *E* runs would have to be turned so it could be used in the links *d* in the Thyng patent, which would not allow the semi-elliptic spring in the Thyng patent to flatten or extend without bringing undue strain on the different parts.

X Q. 402. The hanger *H* of the Beach patent is described in the specification of said patent as being free to vibrate or oscillate in any direction, is it not?

(Objected to as already asked and answered.)

A. It is so stated in the patent, but it is not disclosed in the drawings how this can be accomplished.

X Q. 403. In any event the splay of the semi-elliptic springs in the Thyng patent could be accommodated by the provision of an additional joint in the shackles connecting the ends of said springs to the side bars of the truck, could it not?

(Objected to as already answered, and as irrelevant.)

A. It could be, provided the joint were put in the proper place and in the proper way.

X Q. 404. I call your attention to patents to Brill, No. 627,898 and No. 627,900, these patents being the ones involved in this suit, and ask you to observe claims 13 and 81 of the former, and claims 13, 14, 15 and 17 of the latter. Do you find any mention in any of the above claims of a longitudinal movement or swing of the semi-elliptic springs?

(Objected to as not proper for cross-examination, and because the claim is of a structure disclosed in the specification and drawing to which the claim refers.)

A. The claim 13 of 627,898 patent states:

"The semi-elliptic springs movably and resiliently suspended from the side frames."

For it to be movably supported I consider it has to have movements in every direction; for resiliency, it is absolutely necessary that it have a movement in the direction of its length.

592 If it did not have this movement, it would not be resilient.

In claim 14 of patent 627,900, it states:

"said links comprising a plurality of sections pivotally secured together, and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described."

For this movement to be accomplished as described, it is necessary for the semi-elliptic springs to have a longitudinal movement to be elastically suspended.

X Q. 405. I again call your attention to the above claims, and ask you to answer, without evasion, whether or not you find any statement in any of these said claims directed specifically to a movement of the semi-elliptic springs longitudinally of the truck.

(The same objections are made. Also objection is made to the words in the question, "without evasion," as offensive, uncalled for and impertinent.)

(The question is also objected to as having been already answered.)

A. I do not find any words about "a movement of the semi-elliptic springs longitudinally of the truck," but, as stated above, a semi-elliptic spring, to have resiliency, must have movement in the direction of its length.

X Q. 406. I ask you to examine the specifications of each of the above patents, together with the claims above mentioned, and to state whether or not you find any statement in said specifications or claims directed specifically to a short wheel base truck.

A. I do not find anything in the specifications or the claims, but consider the spring system very well adapted to short wheel base trucks.

X Q. 407. I call your attention to "Defendant's Exhibit, Haskins Patent." Is the wagon body A mounted upon a semi-elliptic spring, which is in turn resiliently supported from the side bar B?

A. I do not consider that it is resiliently supported under the various conditions it would be subjected to. When a load is imposed on this semi-elliptic spring, it will flatten and extend between its ends. This would throw out of alignment the barrel C and the bolt b, causing the head d to bind e, where it is suspended from the side bar D. I do not consider that this semi-elliptic spring F could extend between its ends or to move in the direction of the length of the carriage.

X Q. 408. I call your attention to Fig. 1 of this patent. Is a space provided between both extremities of clip E and the head d of rod b?

A. There is a slight space between the head *d* and the clip E.

X Q. 409. Is the opening *a* in the metallic case inclosing the spring C, shown of larger diameter than the rod *b*?

A. It is shown of slightly larger diameter.

X Q. 410. Could the head *d* of the rod *b* slide along the pin E?

593 A. The width of the head *d*, being so narrow in comparison with the depth of the rod and the barrel casing where it is connected to the semi-elliptic spring, would not move on the pin E, but would tilt at the bottom, binding and probably bending the pin E, when the spring F was extended by a load being imposed upon it.

X Q. 411. In case it were desired to allow the head *d* of bolt *b* to operate freely in every direction upon the pin E, would it not be within the expected skill of a mechanic to enlarge the hole in *e* to permit of such oscillating movement?

A. To enlarge this hole would provide this pin to swing out of a vertical line in the direction of the length of the semi-elliptic spring, but it would not be a properly designed mechanical arrangement. There would be no swing of this pin and the barrel casing in the direction of the spring F, for the reason that the spring F is jointed to the barrel casing by a pin running at right angles to the pin E at the top of the bolt *b*.

X Q. 412. Is not the spring F pivotally connected to the barrel casing?

A. It is pivotally connected, but, as stated above, the pin runs at right angles to the pin; that is, on the other end of this link arrangement, and there is no mechanical swing to a link having two pins connected at right angles to each other.

X Q. 413. Assuming that the hole in the head *d* is large enough to swing laterally of the pin E, would not the pivotal connection of the spring F with the barrel casing permit said spring F to swing transversely of the side frame B?

A. It would allow this spring to swing transversely of the wagon by an unmechanical arrangement, as the head *d* on the pin *b* would tilt up on its edges.

X Q. 414. In that event the semi-elliptic spring F would be movably and resiliently supported from the side bar B, would it not?

A. Yes, it would in the direction of its length, under the conditions I have stated above.

X Q. 415. I call your attention to "Defendant's Exhibit, Davenport and Bridges Patent," reissued December 3, 1850, and particularly to Figs. 1 and 2 of this patent, and ask you to state the manner in which the springs S S are supported from the truck frame.

A. I do not see any springs marked S S on the drawing referred to, but do see a plate which is marked S.

X Q. 416. I call your attention to the specification of this patent. What designation is given to parts S S in said patent?

A. I quote the specification: "metallic springs or plates S S are bolted to the under side of the bars R R."

While this refers to springs or plates, only plates are shown in the drawings.

X Q. 417. How are the parts designated in the specifications springs or plates S S suspended from the truck frame?

594 A. They are suspended by shackles or loops from a semi-elliptic spring which rests on top of the transom of the truck.

X Q. 418. By means of the shackle connections between the parts designated springs or plates S S, and the springs resting upon the transoms, is a transverse movement of said springs or plates S S permitted?

A. Yes.

X Q. 419. In that event the parts designated springs or plates S S are movably and resiliently suspended from the truck frame, are they not?

A. The plates S S are resiliently supported from the transom of the truck. The transverse movements of the plates S are limited or retarded by the semi-elliptic springs *a*. Whatever compressive action of these semi-elliptic springs *a* allows, this governs the transverse movement of the plates S S.

X Q. 420. I call your attention to the following, which I quote from the specification of the above patent:

"From the above it will be seen that the carriage rests upon the plate Y and the friction wheels, or, in other words, by means of the intervening parts on the springs W W so that its perpendicular movements are relieved by the said springs. The connection of these springs with the lower springs or plates S S, on the cross bars R R, by means of the suspension links U U, admits a pendulous or lateral motion of the plank Q, and consequently the carriage is thus permitted to move sidewise."

Do you find this statement appearing in the specifications of the said patent?

A. I do, and immediately following in the specifications I find the following statement:

"When this takes place, one of the shoulders *d d* is pressed against the adjacent spring *a*. Therefore, whenever there is lateral motion of the wheels, so that their flanges strike suddenly against the side of the rail, any unpleasant effect of the same on the carriage and passengers is rendered imperceptible by the relief afforded by the springs *a a*."

X Q. 421. Then the springs *a a* operate the cushion or absorb the transverse or swinging movements of the parts carried by the springs or plates S S; is that correct?

A. They cushion and they also limit this transverse movement.

Cross-examination closed.

(Counsel for complainants, not waiving, but insisting upon his objections to such questions as have been objected to on the record, and such evidence as has been offered, and repeating the notice to strike out the same and tax the cost thereof in any event against the defendant, here also gives notice of a motion to strike out the objectionable and impertinent matter placed on the record by defend-

595 ant's counsel just following question 128 and cross-question 241, and a motion to tax the same against the defendant.)

Redirect examination.

By Mr. RAWLE:

R. D. Q. 422. State whether or not you personally had to do in your department with seeing that the patent plates were attached to the output of trucks?

A. This was a part of my duty and which I attended to.

R. D. Q. 423. State whether or not patent plates relating to the Brill and Curwen patent were placed upon trucks of the 27-G type.

(Objected to, as the witness has already answered the question.)

A. They were not.

R. D. Q. 424. You have been asked on cross-examination about suits brought by the J. G. Brill Company for the protection of their rights under letters patent on trucks, and like suits brought by J. A. Brill. Please state, if you know, when the Bemis Car Box Company first began to put out trucks covered by the Brill patent on non-pivotal trucks having combined spiral and elliptic spring supports, and whether or not suits were brought subsequently against them or one of their vendees thereon.

A. They first put this style of non-pivotal truck out, having combined springs, after the J. G. Brill Company had made and built a lot of this kind, and also, I believe, after the patent was issued to the J. G. Brill Company. There was a suit brought against the Third Avenue Railway of New York City, which was using this Bemis truck, having the same type of spring as the Brill truck. This suit was won by the Brill Company.

R. D. Q. 425. Please state, if you know, when relatively to the introduction of the Brill 27-G type of truck, the Bemis Company began to put out trucks of that type, and what happened.

A. After the J. G. Brill Company put this type of truck out, and after the patent was issued, or while it was pending, the Bemis Company made a truck similar to it, and sold them to different railways. A suit was brought against either the railway or the Bemis Company, and which suit, I understand, was won by the J. G. Brill Company.

R. D. Q. 426. State, if you know, when the Peckham Motor Truck and Wheel Company first put out trucks of the non-pivotal type having combined spiral and elliptic springs and what happened.

A. Some time after the J. G. Brill Company put out and had patented combined spiral and elliptic springs on non-pivotal trucks, the Peckham Company built and sold to different railways trucks similar having combined springs; suit was brought against the Peckham Company, or one of the companies who purchased these trucks, or both.

R. D. Q. 427. State, if you know, when the Maguire Manufacturing Company, of Chicago, began to sell Maximum traction trucks and what happened.



596 A. After the Brill Company made and sold, and either after the patent was issued or while it was pending, for the Maximum traction truck, the Maguire Manufacturing Company made and sold Maximum traction trucks of a similar type; the J. G. Brill Company brought suit against the Delaware County and Philadelphia Electric Railway, who were using these Maguire Maximum traction type of truck. This suit was won by the Brill Company, and the Maguire Manufacturing Company, to the best of my knowledge, abandoned the manufacture of Maximum traction trucks of that type.

R. D. Q. 428. State whether or not the American Car Company, G. C. Kuhlman Company and the John Stephenson Company were truck builders.

A. The American Car Company and the John Stephenson Company built a few trucks, but they could hardly come under the heading of truck builders, as it is generally accepted. The G. C. Kuhlman Car Company I do not think built any trucks.

R. D. Q. 429. State whether or not suits on truck patents have been brought against any of these companies by the J. G. Brill Company at any time, to your knowledge.

A. There have been no suits to my knowledge.

R. D. Q. 430. Would you have been likely to have known of them if there had been?

A. Yes.

R. D. Q. 431. You were asked about a suit brought by the Brills against the John Stephenson Company or the Brooklyn Heights Company. State whether or not this was on truck patents.

A. This suit had nothing to do with trucks.

R. D. Q. 432. Do you know whether this suit has ever been pushed?

A. This suit was pushed.

R. D. Q. 433. To an end?

A. I do not know whether it was completed or not.

R. D. Q. 434. What device was it on?

A. It related to metal seat end panels.

R. D. Q. 435. Have you stated the extent of the truck litigation, so far as you know, brought by J. A. Brill or the J. G. Brill Company, that is, in your cross and redirect examination?

A. Yes; that takes in all the suits that I have any recollection of.

(Complainants' counsel here produces again the Brill sales books produced and testified to at an earlier meeting, and offers in evidence the entries therefrom that have been spread upon the record, and asks defendant's counsel whether he wishes to inspect the said books any further.)

(Defendant's counsel states that he has no desire to further inspect the sales books referred to, but objects to their being offered in evidence, on the ground that they are incompetent, irrelevant and immaterial.)

R. D. Q. 436. State whether or not the Brill and Curwen type of truck is considered in the trade to be suitable for city railway use.



(Objected to as immaterial and irrelevant.)

A. No, it is not.

597 R. D. Q. 437. You have spoken of the Curtis truck. State whether or not it is of the type here in controversy, or whether it is a swing bolster truck, having full elliptic springs inside of the wheel gauge.

A. No, it is not a truck of the same type as that in controversy, as it has a bolster resting on elliptic strings within the wheel gauge.

R. D. Q. 438. The same question as to the Taylor truck.

A. The Taylor truck is not the same type as in dispute, as the bolster rests on elliptic springs, which are between the wheels and approximately within the wheel gauge.

R. D. Q. 439. Under ordinary conditions in narrow city streets, are or are not 27-G trucks ordinarily capable of use under open cars?

(Objected to as immaterial and irrelevant.)

A. They are capable of being used under such cars.

R. D. Q. 440. In the purchase of new truck equipment by the various companies, what is the practice in the trade as between the purchase of modern pivotal trucks and non-pivotal trucks for new equipment?

(Objected to as immaterial, irrelevant and indefinite.)

A. It is the practice to purchase pivotal trucks generally.

R. D. Q. 441. What about their old non-pivotal equipment? What have they done with this?

(Same objection, and further that the questions now being asked are not proper for redirect examination.)

A. They are discarded.

R. D. Q. 442. What has been the practice here in Philadelphia with the non-pivotal equipment?

A. To discard them as fast as practicable.

(Complainants' counsel offers in evidence the *Street Railway Journal* of May 3, 1902, at page 157 thereof, being an advertisement of the Peckham Manufacturing Company, which particular page now offered was an exhibit in the North Jersey case, and which shows a cut of the 14-B-6 truck referred to by the witness Price.)

(The paper offered is marked "Complainants' Exhibit, *Street Railway Journal*, May, 1902.")

(Objected to as incompetent, immaterial and irrelevant, the Peckham Company not being involved in any way in this action; the exhibit is further objected to on the ground that it involves secondary evidence, and further it has nothing thereon to show that the same was published on the date specified, to wit, May 3, 1902.)

(Complainants' counsel here offers again in evidence the file wrapper and contents in the matter of the interference between Charles F. Uebelacker and G. M. Brill, which document has already been offered in the cause during the complainants' *prima facie* case, and was then marked "Complainants' Exhibit, Uebelacker-Brill Interference Record.")

(Counsel for defendant objects to this offer as being incompetent, irrelevant and immaterial. No objection is made to the copy offered as not being certified.)

598 Recross-examination.

By WARFIELD & DUELL, without waiver of objections:

R. X Q. 443. Have you refreshed your memory in regards to any of the suits brought by the Brill Company or John A. Brill against other truck companies operating in this country since you testified during the last session?

(Objected to as irregular at this stage.)

A. No, I have not refreshed my memory.

R. X Q. 444. Do you know of a suit brought by the Brill Company against the St. Louis Car Company, one of the independent companies you have referred to, in which the Brill Company was defeated?

A. Since you mention this, I do recall hearing of such a suit, which occurred many years ago.

Deposition closed.

Adjourned till further notice.

WALTER S. ADAMS.

Sworn to and subscribed before me this 8th day of August, 1905.

SAMUEL BELL, *Examiner*.

*Opinion.*

Filed January 16, 1906.

In the Supreme Court of the District of Columbia.

No. 25161, Equity Docket 56.

JOHN A. BRILL et al.

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

Upon consideration the court is unable to perceive any substantial and decisive difference between the case now presented and that which was decided against the complainants' contention in the United States Circuit Court of Appeals for the Third Circuit, The North Jersey Street Railway Company, appellant, vs. John A. Brill, appellee, defendant's record page 101; and not being convinced that said decision was erroneous, considers it a proper case for the application of the principle of comity.

Accordingly the bill will be dismissed with costs.

WENDELL P. STAFFORD, *Justice*.

Filed January 16, 1906.

In the Supreme Court of the District of Columbia.

No. 25161, Equity Docket 56.

JOHN A. BRILL and J. G. BRILL COMPANY

VS.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

This cause having been heard upon pleadings, testimony and argument, and duly considered, it is now, this 16th day of January 1906, ordered, adjudged and decreed that the bill be, and the same hereby is, dismissed, with costs.

WENDELL P. STAFFORD, *Justice.**Decree, Appeal, &c.*

Filed February 1, 1906.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161, Docket No. 56.

J. G. BRILL &amp; J. G. BRILL COMPANY

VS.

WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

This cause coming on to be heard upon full pleadings and proof, and having been argued by counsel for the respective parties and considered by the court, it is, by the court, this 1st day of February 1906,

Ordered, adjudged and decreed, that the bill of complaint herein be and the same is hereby dismissed with costs to the defendant to be taxed.

And the complainant having in open court prayed an appeal from this decree to the Court of Appeals of the District of Columbia, said appeal is hereby allowed and the penalty of the bond on appeal is fixed at three hundred dollars (\$300.)

WENDELL P. STAFFORD, *Justice.*

Approved as to form.

WARFIELD &amp; DUELL.

600

*Assignment of Errors.*

Filed February 19, 1906.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161, Docket 56.

J. G. BRILL &amp; J. G. BRILL Co.

vs.

WASHINGTON RY. E. Co.

And now comes J. G. Brill and J. G. Brill Co., the above named complainants and say that in the record and proceedings in this cause there is manifest error in this, to wit:—

1. That the court erred in dismissing complainants' bill of complaint.

2. That the court erred in not holding letters patent Nos. 627,898 and 627,900 set forth in the bill of complaint to be valid and infringed by the defendant herein.

Wherefore the said complainants pray that the decree aforesaid may be revised and reversed.

CHURCH & CHURCH,  
*Solicitors for Complainants.*

Washington, D. C., Feb. 19, 1906.

*Memorandum.*

February 19, 1906.—Appeal bond filed.

*Time Extended in Which to File Record.*

Filed April 4, 1906.

In the Supreme Court of the District of Columbia.

In Equity. No. 25161.

JOHN A. BRILL and J. G. BRILL COMPANY

vs.

THE WASHINGTON RAILWAY &amp; ELECTRIC COMPANY.

Upon motion of the complainant- and appellant- and for good cause shown, it is by the Court this 4th day of April, A. D. 1906,

Ordered, that the time for preparing and filing in the Court of Appeals, the transcript of the record in the appeal taken in this cause be, and the same is hereby extended twenty days from this date.

HARRY M. CLABAUGH,  
*Chief Justice.*

601 Supreme Court of the District of Columbia.

UNITED STATES OF AMERICA,  
*District of Columbia:*

I, John R. Young, Clerk of the Supreme Court of the District of Columbia, hereby certify the foregoing pages, numbered from 1 to 634, inclusive, comprising two volumes, marked "Volume I" and "Volume II," to be a true and correct transcript of the record, as per Rule 5 of the Court of Appeals of the District of Columbia, in cause No. 25161 in Equity, wherein John A. Brill and the J. G. Brill Company are Complainants, and the Washington Railway and Electric Company is Defendant, as the same remains upon the files and of record in said Court.

In testimony whereof, I hereunto subscribe my name and affix the seal of said Court, at the city of Washington in said District, this 23<sup>rd</sup> day of April, A. D. 1906.

[Seal Supreme Court of the District of Columbia.]

JOHN R. YOUNG, *Clerk.*

Endorsed on cover: District of Columbia Supreme Court. No. 1662. John A. Brill *et al.*, appellants, *vs.* The Washington Railway and Electric Company. Court of Appeals, District of Columbia. Filed Apr. 23, 1906. Henry W. Hodges, clerk.

602 In the Court of Appeals of the District of Columbia.

No. 1662.

JOHN A. BRILL and the J. G. BRILL COMPANY, Appellants,  
*vs.*  
THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

*Stipulation.*

Counsel for the appellants and appellee herein stipulate that the following exhibits offered in evidence by the respective parties in the Supreme Court of the District of Columbia and read at the final hearing therein, shall be used as exhibits in the Court of Appeals of the District of Columbia, and in the Supreme Court of the United States, if an appeal be taken thereto:

Appellants' exhibits—

File Wrapper of Uebelacker Patent No. 635,986.

Uebelacker-Brill Interference Record.

Re-declaration Uebelacker-Brill Interference.

Thyng Patent Drawing.

Appellee's Exhibits.

Defendant's Exhibit 5, including—

Brill's First Circular 27 Truck;

Brill's Second Circular 27 Truck;

Brill's Circular 27 D Truck.

Also Brill Catalogue by John A. Brill, being defendant's exhibit No. 6;

Also File Wrapper of Brill Patent No. 627,898, being defendant's exhibit No. 3.

WARFIELD & DUELL.

FRANCIS RAWLE.

February 7, 1907.

(Endorsed:) No. 1662. John A. Brill et al. Appellants, vs. The Washington Railway and Electric Company. Stipulation of Counsel. Court of Appeals, District of Columbia. Filed Feb. 7, 1907. Henry W. Hodges, Clerk.

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THURSDAY, *February 7th*, A. D. 1907.

No. 1662.

JOHN A. BRILL and the J. G. BRILL COMPANY, Appellants,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

The argument in the above entitled cause was commenced by Mr. Francis Rawle, attorney for the appellants.

FRIDAY, *February 8th*, A. D. 1907.

No. 1662.

JOHN A. BRILL and the J. G. BRILL COMPANY, Appellants,

vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

The argument in the above entitled cause was continued by Mr. Francis Rawle, attorney for the appellants, and by Mr. H. S. Duell, attorney for the appellee, and was concluded by Mr. Francis Rawle, attorney for the appellants.

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Court of Appeals of the District of Columbia.

In Equity. No. 1662.

JOHN A. BRILL et al., Appellant,

vs.

WASHINGTON RAILWAY & ELECTRIC COMPANY, Appellee.

It is hereby stipulated and agreed, by and on behalf of the appellant and the appellee, that the above entitled case be submitted, on the records and briefs heretofore filed, to Chief Justice Shepard and Associate Justice Robb the surviving Justices who sat in the

cause, and that the decision to be handed down shall have the same force and effect as though it had been announced prior to the death of Associate Justice McComas.

Dated, New York, November 18, 1907.

DUELL, WARFIELD & DUELL,  
*Attorneys for Appellee.*

MELVILLE CHURCH,  
*Att'y for Appellant.*

Jan'y 7, 1908.

(Endorsed:) No. 1662. Court of Appeals of the District of Columbia. John A. Brill et al., Appellant, vs. Washington Railway & Electric Company, Appellee. Stipulation. Court of Appeals, District of Columbia. Filed Jan. 7, 1908. Henry W. Hodges, Clerk.

605

No. 1662.

JOHN A. BRILL and the J. G. BRILL COMPANY, Appellants,  
vs.  
THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

*Opinion of the Court.*

After the former submission of this cause a conclusion was reached, but Mr. Justice McComas, to whom the preparation of the opinion had been assigned, died before it could be delivered and the decree entered. The case has been resubmitted by stipulation of the parties to the two remaining members of the court. Their views remaining unchanged, the opinion prepared by Mr. Justice McComas is adopted and filed as the opinion of the court. In accordance therewith the decree will be affirmed with costs. It is so ordered by the court.

*Affirmed.*

This is an appeal from the decree of the court below on final hearing upon a bill filed by John A. Brill and the J. G. Brill Company to restrain the defendant, The Washington Railway and Electric Company, from infringing upon two letters patent to G. Martin Brill for improvements in car trucks and for an accounting.

The letters patent are number 627,898, and the claims in controversy therein are as follows:

"13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.

"81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described," and numbered 627,900, wherein the claims in controversy are as follows:

"13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described.

"14. In a car-truck, the combination with a side frame, of the cross-bolster suspended below the side frame by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frame, substantially as described.

"15. In a car-truck, the combination of the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and articulate and pivoted links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

"17. The combination in a car-truck having an upper chord, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

These patents bear date of June 27, 1899, the latter of the two patents being divisional in its relation to the former. The original application was filed July 3, 1897, and the divisional application November 9, 1897. Both patents relate to improvements in "car-trucks generally," but especially to trucks employed in passenger service in connection with electric propulsion.

The bill was filed by *Jon John A. Brill*, assignee of the patents and the *J. G. Brill Company*, manufacturers of car trucks in Philadelphia and exclusive licensees under the patents.

The *Peckham Motor Truck and Wheel Company of Kingston, New York*, manufactured the trucks in controversy and later passed over its plant and business to its successor, the *Peckham Manufacturing Company*.

It appears that the present suit is the fifth which has been instituted by the complainants, the first having been prosecuted by *John A. Brill*, assignee of *George N. Brill*, the patentee, without joining the *J. G. Brill Company*, the exclusive licensee of the patent, which was joined in the next two suits. All of these suits involved alleged infringing constructions of the same type as the *Peckham 14 B3* trucks and all of the claims with which we are here concerned were involved in the principal suit in which there was a final adjudication.

In the order named these suits were instituted against *North Jersey Street Railway Company*, in the United States Circuit Court for the District of New Jersey; *Peckham Motor Truck and Wheel Company et al.* and *Peckham Manufacturing Company et al.* in the



United States Circuit Court for the Southern District of New York; Anacostia and Potomac River Railway Company, and the Washington Railway and Electric Company in the Supreme Court of the District of Columbia. The first named suit proceeded to final hearing. The decree of the Circuit Court in favor of John A. Brill was reversed by the United States Circuit Court of Appeals of the Third Circuit and the case was remanded to said Circuit Court of the United States for the District of New Jersey with directions to enter a decree dismissing the bill of complaint with costs. The said Circuit Court of Appeals decided that "claim thirteen of the Brill Patent No. 627,898 and all the other claims in suit which rest upon the like combination" was void for want of patentable invention. Claims 13 and 17 of letters patent No. 627,900 were further declared not infringed. Claims 14 and 15 of the letters patent were not adjudicated.

Preliminary injunctions, which had been obtained in the Southern District of New York in the second and third suits before mentioned, based upon the decision of the Circuit Court in New Jersey in favor of complainant were vacated and reversed upon appeal, the Circuit Court of the Southern District of New York and the Circuit Court of Appeals of the Second Circuit having by comity followed the decision and decree of the Circuit Court of Appeals of the Third Circuit. The suit against the Anacostia and Potomac River Railway Company was discontinued.

It sufficiently appears from the record that the present suit involves the same complainants, the J. G. Brill Company being one of a combination of several companies and having been in privity with John A. Brill in the suit in the Circuit Court for New Jersey; that the manufacturer of the alleged infringing trucks is and was the real defendant in each case; that the Peckham Manufacturing Company is the successor to the Peckham Motor and Wheel Company and that the same type of alleged infringing construction and the same claim of the same letters patent with the exception of claims 14 and 15 of letters patent No. 627,900 which were involved in the New Jersey suit, and as to which no decree was entered are involved herein.

The complainants in this suit have produced the same expert, and, with some exceptions, the same witnesses who testified in the North Jersey suit, and all of the testimony covers the same ground. The defendants herein have for the first time produced two witnesses, alleged experts in Patent Office proceedings, and have cited additional patents as references. The subject-matter of this suit was adjudicated by the Circuit Court of Appeals of the Third Circuit. The present and prior cases are stages of the same controversy between competing truck builders.

Judge Bradford in the court below in the North Jersey suit justly remarked that it was admitted on the part of the complainant that unless the suit be maintained with respect to claim 13 it can not be maintained as to any of the claims of Patent No. 627,898. The same admission and conclusion must be taken as true of claims 13 and 17 of Patent No. 627,900, because these claims cover all that is material in this suit.

The patents in suit belonged to an art in which very many patents have been granted for trucks adapted for use with vehicles propelled by steam or horse power and later, as electric motors have come into use, the art of truck construction, whether relating to car trucks generally or to trucks employed in passenger service in connection with electric propulsion, has with convenient modifications been applied to modern uses.

The claims with which we are here concerned in Patent No. 627,898, involve a truck frame, spring links suspending from the truck frame, semi-elliptic springs connecting the links, and 607 means (a bolster) for connecting the semi-elliptic springs with the car body.

Claims 13, 14, 15, and 17 of Patent No. 627,900 embody the same elements but particularly relate to the details of spring link construction, and this patent being divisional, relates more specifically to the precise form of link construction illustrated therein.

In the specification of Patent No. 627,898 Brill disclaims the location of the spring links and semi-elliptic springs. This disclaimer involves two admissions which appear to preclude the complainants' claims in this controversy. It appears that all of the claims of the two patents in suit are invalid either as anticipated in the prior art or lacking in patentable invention.

We strongly incline to the opinion that these claims disclose no patentable invention over the Thyng patent, and that it did not involve patentable invention to substitute in the Thyng combination of spring supported bolster and nonelastic hangers, the spring hangers or spring supported hangers of the Beach, Haskins, Brill, and Curwen, or other patents, or at the least that the claims of Brill's patents must be limited to the specific form of hangers disclosed in said patents and when so limited in view of the prior art the defendant's structure does not infringe the claims in suit under Brill's patent. We do not intend to discuss these propositions, nor state the grounds which incline us to adopt these conclusions.

In this protracted litigation we are convinced that the claims of comity should be regarded and we should respect the decision of the Circuit Court of Appeals of the Third Circuit which decided this controversy adversely to the appellant here. We strongly incline to agree with the opinion of Judge Acheson speaking for that tribunal. The court below followed that opinion and decision. The Circuit Court of Appeals of the Second Circuit appears to have followed it. Comity applies only to questions which have been actually decided and which arose under the same facts. The able and ingenious argument of appellants' counsel has failed to convince us that there is a material difference between the case we here review and that determined by the Circuit Court of Appeals of the Third Circuit. The real parties to each litigation are the same, the real questions involved are the same; the difference in witnesses and in testimony are not enough to vary the conclusion reached by that court. The additional references and the testimony of Freeman and Sanders are persuasive. As the Supreme Court has said in *Mast, Foos & Co. v. Stover Mfg. Co.*, 177 U. S., 485, 489:

"The obligation to follow the decisions of other courts in patent cases of course increases in proportion to the number of courts which have passed upon the question, and the concordance of opinion may have been so general as to become a controlling authority. So, too, if a prior adjudication has followed a final hearing upon pleadings and proofs, especially after a protracted litigation, greater weight should be given to it than if it were made upon a motion for a preliminary injunction. These are substantially the views embodied in a number of well-considered cases in the circuit courts and circuit courts of appeals. *Macbeth v. Gillinder*, 54 Fed. Rep., 169; *Electric Manufacturing Co. v. Edison Electric Light Co.*, 61 Fed. Rep., 834; S. C., 18 U. S. App., 637; *Edison Electric Light Co. v. Beacon Vacuum Pump and Electric Co.*, 54 Fed. Rep., 678, and cases cited; *Beach v. Hobbs*, 82 Fed. Rep., 916; S. C., 63 U. S. App., 626; see also, *Newall v. Wilson*, 2 De Gex, M. & G., 282."

The appellants' additional evidence here that the truck in suit is the highest development of the art does not answer the argument of Judge Acheson. Uebelacker, the patentee of the patent under which the defendant justifies, it is true, testified to what may appear attempted piracy of the Brill construction, although the witness qualifies his statement and says he did not intend to copy it. But the Circuit Court of Appeals concluded that at the time the appellee's structure was adopted it had the absolute right to make, use, and sell the truck designed by Uebelacker for the Peckham Motor Truck and Wheel Company, and the witness further testified that he was familiar with the Thyng and Haskin's patents and did not regard the spring arrangement of the Brill truck therefore as anything new in the art. It is true that the relative importance of different patents relied on in the New Jersey case and in this to show that the appellants' patents are invalid or not infringed is differently valued in the two different suits. It appears to us that the New Jersey court has found enough to justify its conclusion that the patentee Brill made a substitution which may have secured better results, but which did not involve invention; nor in our opinion did that court err in holding that the disclaimer we before quoted is a solemn confession of priority in favor of Brill and Curwen or in concluding that the only difference between the combination shown and claimed by Brill and Curwen and the principal combination of the claims involved in that suit (as in this) was that the latter claims called for a semi-elliptic spring for connecting the links, instead of equalizing bars, nor did the court err, in our opinion, in saying that it was old to use semi-elliptic springs for connecting the links. If patentable invention is lacking in the claims of the parent patent it appears that the claims of the second patent must fall within the claims of the first patent when broadly construed. At least if claims 14 and 15 are valid when specifically construed the appellee does not appear to have infringed these claims.

We are convinced that it was proper and expedient for the court below to apply the doctrine of comity to this case, and that the decree of the court below dismissing the bill of complaint in this cause should be affirmed with costs and it is so ordered.

WEDNESDAY, *January 8th, A. D. 1908.*

No. 1662. January Term, 1908.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Appellants,  
vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

Appeal from the Supreme Court of the District of Columbia.

This cause came on to be heard on the transcript of the record from the Supreme Court of the District of Columbia, and was argued by counsel. On consideration whereof, It is now here ordered, adjudged and decreed by this Court that the decree of the said Supreme Court in this cause be, and the same is hereby, affirmed with costs.

*Per Curiam.*

January 8, 1908.

MONDAY, *January 20th, A. D. 1908.*

No. 1662.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Appellants,  
vs.

THE WASHINGTON RAILWAY AND ELECTRIC COMPANY.

On motion of Mr. Melville Church, of counsel for the appellants in the above entitled cause, It is ordered by the Court that said appellants be allowed an appeal to the Supreme Court of the United States, and the bond for costs is fixed at the sum of three hundred dollars.

609 Court of Appeals, District of Columbia.

No. 1662. October Term, 1906.

JOHN A. BRILL and THE J. G. BRILL COMPANY, Appellants,  
vs.

WASHINGTON RAILWAY & ELECTRIC CO.

*Assignment of Errors.*

And now comes J. A. Brill and the J. G. Brill Company, the above named appellants, and say, that in the record and proceedings in this cause there is manifest error in this, to wit:

I. That the court erred in affirming the decree of the court below dismissing the bill of complaint for want of equity.

II. That the court erred in affirming the decree of the court below holding the letters patent No. 627,898 and 627,900, and each of them, set forth in the bill of complaint, to be invalid.

III. That the court erred in affirming the decree of the court below holding letters patent Nos. 627,898 and 627,900, and each of them, to be not infringed by the defendants.

IV. That the court erred in adopting the opinion and judgment of the Court of Appeals for the Third Circuit and in not independently coming to its own opinion and judgment on the evidence in the case before it.

V. That the court erred in applying the doctrine of comity to the case before it and dismissing the bill of complaint thereunder.

Wherefore the said appellants pray that the decree aforesaid may be revised and reversed.

MELVILLE CHURCH,  
*Sol'r for Appellants.*

(Endorsed:) No. 1662. John A. Brill and J. G. Brill Company, Appellants, vs. Washington Railway & Electric Company. Assignment of errors. Court of Appeals, District of Columbia. Filed Jan. 28, 1908. Henry W. Hodges, Clerk.

610 Court of Appeals, District of Columbia, October Term, 1906.

No. 1662.

JOHN A. BRILL & THE J. G. BRILL COMPANY, Appellants,  
vs.

THE WASHINGTON RAILWAY & ELECTRIC COMPANY.

*Cost Bond on Appeal.*

Know all men by these presents that we, The J. G. Brill Company, a corporation created and existing under the laws of the State of Pennsylvania, as principal, and Fidelity and Deposit Company of Md., a corporation created and existing under the laws of the State of Maryland, as surety, are held and firmly bound unto The Washington Railway & Electric Company in the full and just sum of three hundred dollars (\$300.), to be paid to the said, The Washington Railway & Electric Company, its successors or assigns; to which payment well and truly to be made we bind ourselves and our successors, jointly and severally, by these presents.

Sealed with our seals and dated this 23rd day of January, in the year of our Lord one thousand nine hundred and eight.

Whereas, lately at a Court of Appeals of the District of Columbia in a suit depending in said Court, between John A. Brill and the J. G. Brill Company, appellant, and The Washington Railway & Electric Company, appellee, a decree was rendered against the said John A. Brill and The J. G. Brill Company, and the said John A. Brill and the J. G. Brill Company having prayed and obtained an appeal to the Supreme Court of the United States to reverse the decree of the said Court of Appeals of the District of Columbia in the aforesaid suit and a citation directed to the said the Washington Railway and Electric Company, citing and admonishing it to be and appear at a Supreme Court of the United States, at Washington, within thirty days from the date thereof;

Now, the condition of the above obligation is such that if the

611 said John A. Brill and the J. G. Brill Company shall prosecute said appeal to effect and answer all costs if they fail to make their plea good, then the above obligation to be void; otherwise to remain in full force and virtue.

THE J. G. BRILL COMPANY,  
By JAMES RAWLE, *President*.

[Seal of The J. G. Brill Company.]

FIDELITY & DEPOSIT CO. OF MARYLAND,  
By W. H. RONSAVILLE, *Attorney-in-Fact*.

[Seal of Fidelity & Deposit Company of Maryland.]

Witness:

KILBOURN GORDON.

Approved

SETH SHEPARD,  
*Chief Justice*.

(Endorsed:) No. 1662. Court of Appeals, District of Columbia. John A. Brill & The J. G. Brill Company, Appellants, vs. The Washington Railway & Electric Company. Cost bond on appeal. Court of Appeals, District of Columbia. Filed Jan. 29, 1908. Henry W. Hodges, Clerk.

612 UNITED STATES OF AMERICA, *ss.*:

To The Washington Railway and Electric Company, Greeting:

You are hereby cited and admonished to be and appear at a Supreme Court of the United States, at Washington, within 30 days from the date hereof, pursuant to an order allowing an appeal, filed in the Clerk's Office of the Court of Appeals of the District of Columbia, wherein John A. Brill and the J. G. Brill Company are appellants and you are appellee, to show cause, if any there be, why the decree rendered against the appellants, should not be corrected, and why speedy justice should not be done to the parties in that behalf.

Witness, the Honorable Seth Shepard, Chief Justice of the Court of Appeals of the District of Columbia, this 29th day of January, in the year of our Lord one thousand nine hundred and eight.

SETH SHEPARD,  
*Chief Justice of the Court of Appeals of the  
District of Columbia.*

Service accepted this 30th day of January, A. D. 1908.

DUELL, WARFIELD & DUELL.  
C. H. DUELL.

[Endorsed:] Court of Appeals, District of Columbia. Filed Jan. 31, 1908. Henry W. Hodges, Clerk.

613 Court of Appeals of the District of Columbia.

I, Henry W. Hodges, Clerk of the Court of Appeals of the District of Columbia, do hereby certify that the foregoing printed and type-written pages numbered from 1 to 612 inclusive contain a true copy of the transcript of record and proceedings of said Court of Appeals in the case of John A. Brill and the J. G. Brill Company, Appellants, vs. The Washington Railway and Electric Company, No. 1662, January Term, 1908, as the same remains upon the files and records of said Court of Appeals.

In testimony whereof I hereunto subscribe my name and affix the seal of said Court of Appeals, at the City of Washington, this 31st day of January, A. D. 1908.

[Seal Court of Appeals, District of Columbia.]

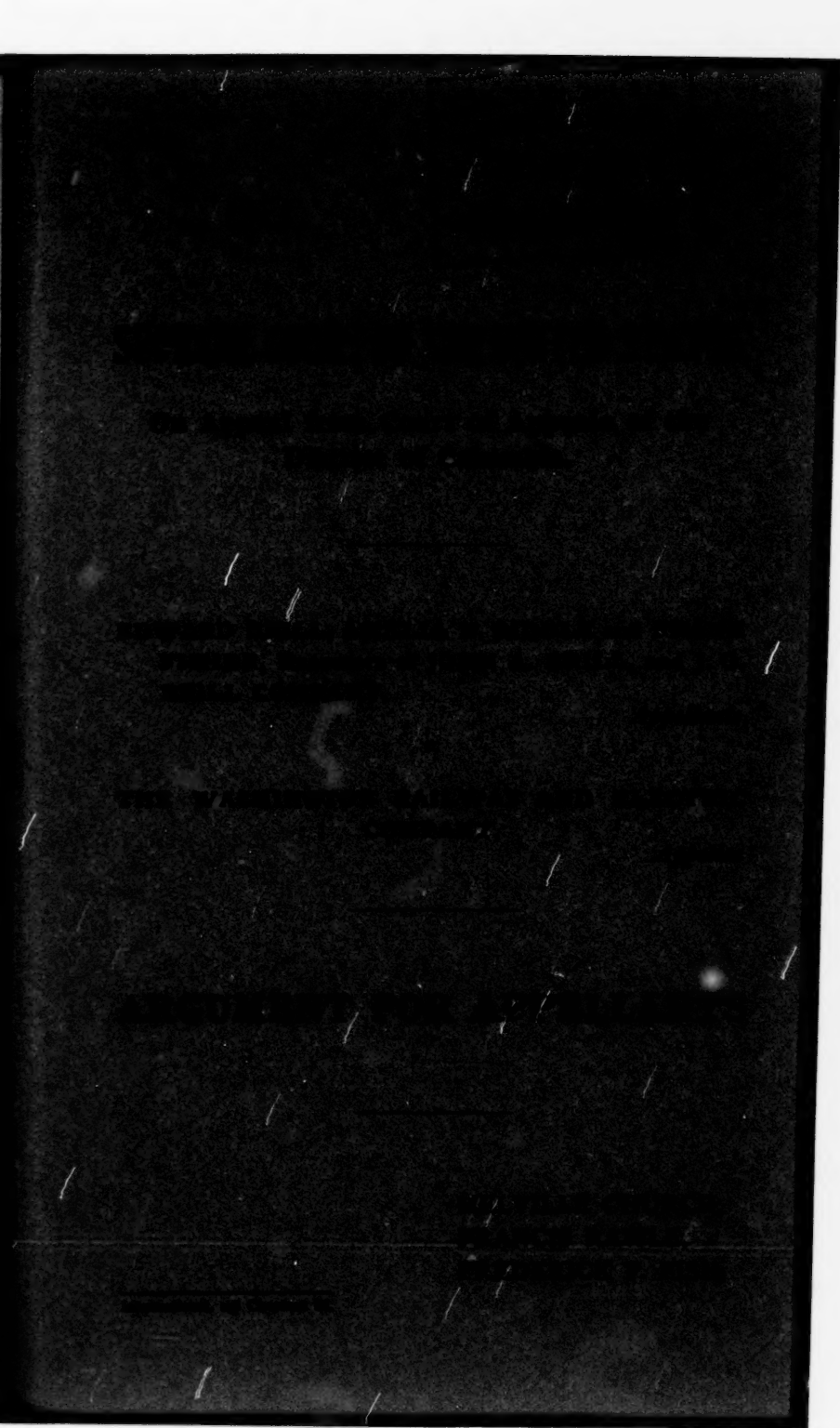
HENRY W. HODGES,  
*Clerk of the Court of Appeals of the District of Columbia.*

Endorsed on cover: File No. 20,999. District of Columbia Court of Appeals. Term No. 66. John A. Brill and The J. G. Brill Company, appellants, vs. The Washington Railway and Electric Company. Filed January 31st, 1908. File No. 20,999.









**EXHIBITS BELOW NOT CONSECUTIVELY ARRANGED**

Exhibits 1-100 are arranged 1 to 100.

Exhibits 101-150 are arranged 101 to 150, photograph of defendant's  
wife, picture of son, and defendant's picture follow.

Exhibits 151-200 are arranged 151 to 200.

Exhibits 201-250 are arranged 201 to 250.

Exhibits 251-300 are arranged 251 to 300, also pp. 14 to 30.

Exhibits 301-350 are arranged 301 to 350.

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IN THE  
Supreme Court of the United States.

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EDWARD BRILL, AMELIA B. RIDDLE AND  
FRANK FISHER, EXECUTORS OF JOHN A. BRILL  
AND J. G. BRILL COMPANY,

*Complainants-Appellants,*

*v.*

THE WASHINGTON RAILWAY AND ELECTRIC  
COMPANY,

*Defendant-Appellee.*

---

APPEAL FROM THE COURT OF APPEALS OF THE DISTRICT  
OF COLUMBIA.

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**ARGUMENT FOR APPELLANTS.**

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**A STATEMENT OF THE CASE.**

This was a bill in equity in the ordinary form, for an injunction and an accounting, in the Supreme Court of the District of Columbia, brought by John A. Brill and the J. G. Brill Company against the Washington Railway and Electric Company on two letters patent of the United States, issued to G. Martin Brill, for improvements in car trucks. At the time of filing the bill, John A. Brill held the title to the patents and the J. G. Brill Company, car truck builders at Philadelphia, were sole licensees thereunder. The case was defended by the Peckham Manufacturing Company, of Kingston,



New York, a competing builder of car trucks, who had manufactured the trucks complained of. The Supreme Court of the District dismissed the bill *pro forma* under comity, based upon a decision of the Circuit Court of Appeals for the Third Circuit holding void the patents here involved and reversing a decree of the Circuit Court for the District of New Jersey, which had sustained their validity.

An appeal was then taken to the Court of Appeals of the District of Columbia, who also applied the doctrine of comity, finding as the Court said, nothing in the record to induce them to take a different view from the Circuit Court of Appeals of the Third Circuit. This appeal was then taken.

Two patents are involved, a parent patent and a divisional patent. Infringement of the parent patent is not denied, and is not seriously denied as to the divisional patent. The defence consists solely of about 20 earlier patents, with expert evidence thereon, going to the validity of the patents in suit.

It appears that the predecessor of the Peckham Co., defending this case, sent its engineer, Charles F. Uebelacker to examine the first trucks of this type in use in the East, (pending the issue of patents thereon) and thereupon proceeded to manufacture like trucks on a large scale in competition with the Brill Company. It also, as Assignee before issue of the same Uebelacker, filed an application for Letters Patent on the broad features of the truck in controversy, which it had copied and was selling. Against this application certain prior art patents here chiefly relied upon by the Peckham Company, defendant, as anticipating the invention of the Brill Letters Patent in suit, were cited as references. The Peckham Company, applicant, took the position in the Patent Office, as shown by the File Wrapper, that the references cited against its appli-

cation disclosed entirely different structures from the one it was seeking a patent on, and were not applicable. Accordingly the Patent Office appears to have withdrawn these references as not applicable and to have affirmed patentable invention under the Peckham application.

Then followed interference proceedings between the application of Brill for letters patent on the truck here in suit and the Uebelacker-Peckham application, both parties claiming the broad features of the truck. The Peckham date of invention was put at a date subsequently to the inspection of the Brill trucks by Uebelacker, as just stated. Priority of invention was awarded to Brill, and the patents in suit were thereupon issued to Brill. Still the Peckham Company continued to sell the truck in large quantities, in competition with the Brill truck. The Brill Company sales were very large the truck taking the market very rapidly and completely. This record shows, without dispute, that the invention of the truck in controversy made possible high speed electric propulsion of street railway cars and that before its invention and introduction no other truck adaptable to this purpose was known to the trade. It also appears without dispute that no steam railroad truck was suitable for electric railway service.

The defendant-appellee justified under the Uebelacker-Peckham Patent which was issued on its application for certain special truck features remaining in the application after priority of invention had been awarded to Brill in the interference proceedings.

---

### **SPECIFICATION OF ERRORS.**

The error specified is to the decree of the Court below in affirming the decree of the Supreme Court of the District of Columbia ordering the bill to be dismissed.

### ARGUMENT.

The letters patent in suit relate to pivotal trucks for electric railway propulsion, two of which are placed under the long-body street cars now in common use.

The patents are:

No. 627,898, claims in controversy 13 and 81.

No. 627,900, claims in controversy 13, 14, 15 and 17.

Both are dated June 27, 1899.

The truck was invented in December, 1895; the first actual sale was in March, 1896, to the Mt. Tamaalpais Scenic Railway in California. A photograph of this truck is at page 136.

A parent patent and two *divisional* patents were issued. The parent patent and the second of the *divisional* patents are here involved.

The patentee assigned the patents to John A. Brill on July 8, 1899. The J. G. Brill Company became exclusive licensees. Record, p. 77.

The general features of the Brill truck can be conveniently seen in a photograph at page 136 of the record, as well as in the patent drawings (p. 103 etc.). The spring-link system shown in this photograph is not that in controversy. The latter appear in figs. 1, 3 and 4 of sheet 1 of the *divisional* patent in suit, 627,900, at page 119 of the record.

The truck may be described as follows:—

The two truck side frames rest upon the pedestals; they are connected transversely near the middle of their length by two metal beams called transoms having sufficient space between them to accommodate the bolster which moves vertically occupying the space between the transoms with slight play only. The car body rests upon the middle of the bolster, with a pivotal connection, and with side bearing plates on the ends of the bolster. The ends of the bolster rest upon semi-elliptic springs disposed longitudinally of the truck, and

lying under the side frames. The springs are supported at their ends by two spring links which are dependent from the side frames at points near the axles. The links are articulated. Between the ends of the semi-elliptic springs which they support and the lower ends of the spring links, are link springs. The connection between the spring-links and the side frames is a universal or ball and socket connection.

The general features of the truck may be observed in the photograph of the Mt. Tamalpais truck at p. 136 of the record or on the sheet of photographs at the end of this Brief—the first cut. The peculiar form of spring-link of the divisional patent in suit may be found in figs. 1, 3 and 4 of sheet 1 of the drawings of patent in suit 627,900 (Record, p. 119 ), and in the second cut on the sheet at the end of this brief.

In electric propulsion, the car is started and propelled by force applied to turn the wheels. The forward motion of the truck brings the transom against the bolster and imparts motion to the car body through the bolster. Steam cars, on the other hand, are drawn by force applied to the car body and thence to the trucks, through bolsters coming in contact with the transoms to which they impart motion.

Claims 13 and 81 of patent No. 627,989 in suit cover the general features of construction and are as follows:

“13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.”

“81. The combination, in a car-truck, of the side-frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described.”

The claims of the divisional patent No. 627,900 relate to improvements in certain elements (the spring-links of a truck of the general structure of the parent patent No. 627,898).

The claims relied upon are as follows:

"13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described.

"14. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together, and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

"15. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and articulated and pivotal links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic spring from the side frames, substantially as described.

"17. The combination in a car-truck having an upper chord, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

## THE DEVELOPMENT OF ELECTRIC STREET RAILWAY TRUCKS.

A brief statement of the development of street railway trucks is necessary to a clear understanding of the issues involved in this case. The facts are not disputed. (See *Akarman*, Rec., p. 420, Q. 5.)

It is well known that in the old horse car street railway practice the running gear consisted chiefly of four pedestals which surrounded the axle boxes and were bolted rigidly to the side sills of the car. The car and its running gear were a unit.

When electric motors were first introduced, they were mounted upon the car body and the power was conveyed to one of the axles by a sprocket chain. This was not successful. The motor was subject to the motion of the car body on the car springs and there was too much looseness of parts between the motor and the driven axle. The earliest electric roads were a mechanical and financial failure. Then motor trucks were introduced. In these the pedestals were connected by two side beams, transversely connected by cross beams. These parts together constituted the "axle box frame." The car springs (which were all spiral springs) were supported on the axle box frame, and they supported a rigid rectangular frame upon which the car body was removable. The "axle box frame" kept the wheels and axles in parallelism; it was free from the motion of the car springs and served as a support for the free end of the motor, the other end of which was sleeved on one of the axles.

Such a truck was, in effect, a locomotive and could be run with or without a car body resting upon it. It carried an open car body in summer and a closed car body in winter.

The early car bodies were short. As the length of the car body increased, the extreme overhang of the

platform caused an oscillating or galloping motion of the car when rapidly run, and this tendency became a serious evil. It was met and remedied to the satisfaction of the trade, by the substitution of a *combination of spiral and elliptical* springs (in place of *all spiral* springs) between the "axle-box frame" and the upper frame upon which the car body rests.

This construction of truck was first introduced by the J. G. Brill Company. (Rec., p. 423, Q. 12.) Since its introduction it has been, and to-day is, almost universally used under 4-wheel cars.<sup>1</sup>

The limit of the use of single-truck cars was about reached when the car bodies grew to 16 feet in length. An additional length made it necessary to use double-truck cars—that is, car bodies mounted upon two 4-wheel *pivotal* trucks. *At this time there was no pivotal truck on the market or known to the trade which was suitable for electric street railways. Steam railroad practice furnished nothing which could meet the new requirements of electric street railways. Thus, Mr. Akarman testified* (Rec., p. 423):

"Q. 13. You have sketched the history of electric street railway trucks. Will you state whether or not *that art learned anything* from the steam railroad truck art, giving your reasons for your answer?

("Objected to as incompetent and irrelevant, and as containing an assumption in the use of the term 'art.')

"A. *It did not*, the conditions and requirements being entirely different. The steam railroad truck being a truck that was hauled in practically straight lines, the strains on this type of truck and requirements were entirely different from what they are in a truck that has to be propelled by ma-

<sup>1</sup> The letters patent to G. Martin Brill on the truck, representing this important advance in the art, were sustained by a judgment (*Shipman, C. J.*) in the United States Circuit Court for the Southern District of New York. (*Brill v. Third Ave. R. Co.*, 103 Fed. 289.)

chinery attached to it. The electric truck's strains were those incidental to the movement of a large weight attached to one part of the trucks by means of power attached to the axles. The strains were those incidental to overcoming the *inertia* of a large body standing still. Again, the turning of short radius curves, and thereby overcoming the centrifugal force, brought about other strains that were not developed in steam railroad practice. Again, the width of the car required a narrower form of construction than used in steam railroad practice, and also the requirement in length of the truck had to be essentially different from trucks used on steam railroads.

"Again, the requirements in electric practice of being compelled to hang the car body *within a given distance of the ground*, which requirement was made necessary by a limit to the number of steps that could be used in street railway practice to enter and leave the car, was entirely different from the requirements in steam railroad practice.

"The electric truck had to be so constructed as to properly accommodate the motors which are hung on the axle and suspended from the frame of the truck.

"Q. 14. State whether or not there are any differences between the electric practice and steam practice growing out of the turning of sharp curves at speed, change of grade and greater inequality of track conditions on electric roads, leading to strains which do not exist in steam practice.

("Objected to as incompetent, irrelevant and as containing an assumption of fact.)

"A. *The conditions are entirely different.* In steam practice the curves are all very slight, being of very long radius, and the direction is overcome by changing the center of gravity by raising the outer rail, so that there is practically no lateral strain in turning curves in steam railroad practice. In electric practice the curves are of very short radius, the direction of the car being taken care of by guard rails, the center of gravity remaining



the same, as the tracks are on the same plane. This means great friction and a great lateral strain.<sup>1</sup>

"Q. 15. In steam practice does the car haul the truck or the truck haul the car, and how is it in electric practice?

"A. In steam practice the car body is first set in motion and the truck is hauled; in electric practice the truck is first in motion, and imparts said motion to the car body, which is attached to the upper part of the truck. This brings out very severe strains on the truck, being increased largely in proportion to the load carried on the car and to the weight of the car body.

"Q. 16. In steam practice at what point of the structure does the movement of the car body, when the locomotive starts, impart motion to the truck structure?

"A. The bolster is attached to the car body and moves with it until it strikes the transom, which is a part of the truck structure, and the motion is imparted downward to the wheels; in electric practice the wheels are first set in motion, and the motion is imparted upward to the car body.

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<sup>1</sup> It is true that the defendant's witness, Mr. Freeman, stated that "the steam railway standards of former times" have "again become available and have been, in a measure at least, adopted by the electric railway car truck builders." (Rec., p. 210, XQ. 31.) But this witness is shown by his own admission to have been almost entirely ignorant of the truck art. (Rec., p. 207, XQ. 7 to XQ. 27.) And in his comparison, of the former steam car practice with the modern electric practice, he entirely overlooks the important fact that in load, speed and almost in car body weight, the latter practice to-day equals the former. He was unable to state "what different types of pivotal street railway trucks are to-day in use throughout the country." (Rec., p. 211, XQ. 34.)

Again, Mr. Freeman evinces lack of knowledge of the situation (Rec., 212, top of page) by stating that "in modern steam railroads the weights carried are much greater than in the modern suburban electric railroad practice." The crowded street cars familiar to us all negative this testimony.

He speaks (Rec., p. 210, top of page) of the old steam car truck art as illustrated by the patents to Buck, Davenport & Bridges, Thyng and Romans, whereas, except on paper, there is no evidence here that these patents really constituted a part of that art, and a mere inspection of them will satisfy anyone that they did not. On the contrary, it is shown by the evidence of *Mr. Akarman* and *Mr. Harrington*, who have passed their lives in this business, that the modern growth of electric practice has been on entirely different lines from those patented devices as well as from the steam road practice.

This is an exact reversal in the manner of imparting the motion."

*Mr. Harrington* testified (Rec., p. 458):

"Q. 11. As a practical truck man, what light did the *steam railroad* truck practice, throw upon the electric street railway truck practice?

"A. The Master Car Builders' truck as employed by the steam railroads *was not adapted to the requirements of trolley equipment*, in that the method of construction raised the car too high from the street, the wheel base of the truck was too long, the motors were not required in the Master Car Builders' truck, and there was no provision for mounting the motors."

The new requirements were at first apparently met by the introduction by the J. G. Brill Company of a new type of pivotal truck which came to be generally known in the trade as the "Maximum Traction" truck. A truck of this type had a pair of large wheels at one end and a pair of small wheels at the other. The pivotal point (the connection between the car body and the truck) was *eccentric*, being placed over or nearly over the axle of the large wheels. The large wheels were the driven wheels on which the motor was sleeved. The pivotal point being *eccentrically* placed over or nearly over the large wheel end of the truck, the pivotal radiation of the truck in rounding sharp curves was very slight in respect of the large wheels, while the small wheels were so low that they could radiate under the car sills. In this way the car body could be hung low, because the large wheels with their *slight radiation* would not strike the sills of the car, but radiate between them. Only one motor could be used on each truck (geared to the large wheel axle).<sup>1</sup>

Trucks of this description were the first pivotal

<sup>1</sup> Merely as showing the general features of this type, see photograph in Record, p. 154, the lower cut.

trucks successfully used on narrow streets, and for some time were *the only known* type of truck suitable for that purpose. They were devised, patented and put on the market by the J. G. Brill Company. (Rec., p. 421.)<sup>2</sup>

Mr. Harrington testified as to this type (Rec., p. 459, Q. 14):

“A. The early development of railway rolling stock was along the lines of longer cars, and the invention of the Maximum Traction truck, so called, was the result of this demand, brought about by the two controlling factors; first, you get a truck that would radiate under bodies and that would admit of use of one motor only. The Maximum traction equipments in the early days were confined almost exclusively to relatively slow speed equipment.

“The necessities dictated having the car body as close to the ground as possible, in order to avoid the high step from the ground to the platform of the car, and also to provide that the car would go under bridges and the usual overhead construction usually present in cities and towns.”

The “Maximum Traction” truck at first met the requirements of the business, but as the street railway business continued to develop, new conditions arose. Mr. Harrington, manager of the electric railway system of Camden, points out (Rec., p. 459, Q. 15 to 20), that the Maximum Traction trucks *failed* in some respects, to meet these new conditions and the consequent demand for a new truck.

*The truck of the Brill patents in suit was then invented to meet the new requirements of the trade.* It was a center pivotal, short wheel base truck, upon which the car body could be *hung low enough*, and on which four electric motors could be used on each car.

<sup>2</sup> The fundamental and controlling patents on them were sustained by a decree in the Circuit Court for the Eastern District of Pennsylvania, in *Brill v. Delaware Co. and Philadelphia Railroad Co.*, 109 Fed. 901, from which no appeal was taken.

### The Truck in Suit Constituted the Highest Development of the Art.

The history of the development of electric trucks since their introduction is thus summarized by Mr. Akarman, an experienced street railway man. Rec.' p. 427, answer to Q. 36):

"There were *three distinct epochs* in the development of trucks, *first* being the production of a *truck*, by that I mean an independent piece of mechanism separate from the car body, to which the electric motors could be attached and become part of; the *second* step in the development of trucks was the production of trucks of the 'Maximum traction' type, which type of trucks met the requirements up to a certain length of car body run at a limited rate of speed; THE THIRD EPOCH CONSISTED IN THE DEVELOPMENT OF PIVOTAL TRUCKS OF THE TYPE OF THOSE IN DISPUTE."

Mr. Akarman then defined the place in the art of the Brill truck in suit as follows:

"Q. 38. State whether or not, in your opinion, you consider the truck of the type here in controversy as constituting from your practical standpoint an advance in the truck art.

"A. I CONSIDER THE PRESENT TYPE OF TRUCK IN CONTROVERSY TO BE THE HIGHEST DEVELOPMENT AT THE PRESENT TIME IN THE ART OF TRUCK MANUFACTURE."

Mr. Harrington fully agreed with him (Rec., p. 460, Q. 19):

"The adoption of the center pivotal truck as represented in the 27-G Brill and 14-B-3 Peckham marked a *very substantial and necessary development* in the use of railway trucks for trolley purposes."

"The *next epoch* showed the necessity for higher speeds and a larger capacity in motors

made up in multiple equipments rather than fewer motors of larger capacity. This led up to the 27-G and 14-B-3.<sup>1</sup> *The success following brought us to the practice of to-day.*" (Rec., p. 468, XQ. 51, at end of answer.)

"In about 1898, and with the adoption of the trucks [of the] 27-G and 14-B-3 type, began a development in street railway practice resulting in *the investment of millions of dollars which is attributable to no other reason than the opportunity offered by the use of trucks of the above-mentioned description.*" (Rec., p. 463, Q. 37.)

The same witness also testified that the present *high-speed* practice with long cars, running at times 50 miles an hour, "*could not be done with the use of any truck known to the trade prior to the introduction of the type of truck here in controversy.*" (P. 463, XQ. 36.)

Also, that this truck represents the "*current practice for strictly city and suburban work.*" (P. 468, XQ. 54.)

Further he testified:

"The development of only the last three or four years [in urban and interurban extension] and is *brought about by the results* obtained from the inventions of the 27-G and 14-B-3 trucks." (P. 467, XQ. 48.)

"The development of heavy traction work is *purely the results* of the practical demonstration of the financial successes in the use of the double-truck cars, whose OPERATION WAS ONLY PERMITTED IMMEDIATELY FOLLOWING THE INVENTION AND RADICAL DEPARTURE IN TRUCK CONSTRUCTION AS EMBODIED IN THE 27-G AND 14-B-3 TRUCKS." (P. 467, XQ. 50)

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<sup>1</sup> "27-G" indicates the truck of the patents in suit; "14-B-3" is the truck here complained of.

### Dates of Invention and Patenting.

The earliest trucks containing the structure of the patents in suit were completed by the Brill Company on March 28, 1896, and were shipped on that date to the Mill Valley & Mt. Tamalpais Scenic Railway Company in California. Thus:

*Walter S. Adams* (Rec., p. 394, Q. 14, 15), produced a photograph of one of these trucks, which is reproduced at p. 136 of the Record and marked "Photograph of Mt. Tamalpais Truck."

The date of shipment is proved at p. 398, Q. 43, by the production of the Brill Company sales book, and at p. 184 by a second production of the same sales book, coupled with the testimony of *John T. Dunlap*, who made the entries in them.

The invention of the truck was in December, 1895; this is shown by *Walter S. Adams* (Rec., p. 394, Q. 15, to p. 399, Q. 45). He produced a series of five drawings, beginning with the drawing of December 30, 1895, all showing the earliest drawings made at the Brill works for this type of truck. Also five tracings made therefrom and five blue prints made from the tracings. All these drawings, tracings and blue prints were offered in evidence at p. 399. The blue prints, by stipulation, are substituted for the tracings and drawings, unless the latter be called for at final hearing. The blue prints, marked "Complainants' Exhibit, Blue Print," with the date thereof, are reproduced at pp. 137 to 141.

July 3, 1897, the patentee, G. Martin Brill, for many years before and continuously since then until his death in March, 1906, the president of the J. G. Brill Company filed an application in the Patent Office for letters patent on this invention. His application covered the broad features of the invention and also several specific embodiments of it. The Patent Office

rules required a division of the application into three parts, and on November 9, 1897, two divisional applications were filed. The original application subsequently led to the issue of the parent Patent No. 627,898, and the two divisional applications resulted in Letters Patent Nos. 627,899 and 627,900. The *second only* of these divisional patents is here in suit.

### **Special and Exacting Requirements of Electric Street Railway Practice.**

Before taking up the subject matter of the patents we will consider the requirements of electric street railway practice.

The requirements of modern electric street railways for cars running as fast as 30 miles an hour in narrow city streets with sharp curves are as follows:

1. A long car body, at least 30 feet in length, with two 4-wheel *pivotal* trucks. This provides 4 axles for mounting 4 powerful motors.

2. The car body *must be hung low enough* to require but a single step from the platform to the ground.

Nothing need be said as to the use of long cars; they are used because they are obviously more profitable to operate.

Low-hung car bodies are required for the convenience and safety of passengers, and for rapidity in getting on and off the car. A high car body would require an additional carstep; with an additional car step the width of the structure would have to be greater, or else space for the additional step would have to be taken from the width of the platform. Neither of these arrangements would be satisfactory in practice. The width of cars operated in narrow streets with sharp curves cannot be increased, and

narrower platforms would furnish less room for passengers.

With wheels of the standard height (33 inches), the car body sills must come *below the tops* of the wheels, and consequently if long wheel base trucks were used, the radiation of the wheels in rounding sharp curves would bring the wheels into contact with the car sills. It is only by the use of *short wheel base* trucks (when a centre pivotal point is used) that the radiation of the wheels between the car sills can be reduced within the necessary limits to enable a pivotal truck to be used under a low-hung car. (See testimony of *Akerman*, p. 419, and *Harrington*, p. 456.)

In *steam cars*, which are always mounted on pivotal trucks, the height of the car body is not, within limits, important. Steam cars have, in practice, three or four steps; the car bodies are *set above the tops of the wheels*, which have ample room to radiate *under* the car sills. This and other considerations explain why it is that in building electric street cars nearly as long as steam cars the various types of trucks in use on steam roads in the past, including the present *standard* steam railway truck now in general use, known as the "*Master Car Builders'*" truck, are *not practical in electric railway practice*.

It is pointed out above that at the time of the invention of the truck here in suit only the following types of trucks were in use (with but slight exceptions):

1. *Non-pivotal* trucks under 4-wheel cars.
2. *Pivotal* trucks of the "Maximum Traction" type, two of which were placed under each car body.

It may be said here that in modern high speed electric street railway practice the *truck exactions* are most severe. Not only is speed constantly kept up to the average steam railway speed, but its severe work is to



be done on much more irregular tracks, with frequent changes of grade and constant and sharp curves (with no raising of the outer rail), and with frequent startings and stoppings, in which great strains are created by brakes. None of these conditions are present in steam railroad practice; all of them place tremendous strains upon the electric truck, which, to meet them, must possess not only great strength, *but must be of correct mechanical construction*. Hence it is, undoubtedly, that the art has, since the introduction of pivotal street car trucks, known practically but two successful types, the "Maximum Traction" type and *the type here in controversy*—the former a partial success, and the latter here shown to be an entire success.

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### LETTERS PATENT IN SUIT.

#### 1. Parent Patent No. 627,898.

Letters Patent No. 627,898 relate to the general features of construction of a truck; and No. 627,900 (a divisional patent) relates mainly to improvements in certain elements of a truck, the general structure of which is the same as in the parent patent, No. 627,898.

*Mr. Livermore*, the appellants' expert witness, testified as to the parent patent as follows (Rec., p. 81):

"Taking up first the patent No. 627,898, which I will call the first Brill patent, the main objects to be attained by the construction therein shown are to provide an efficient support for the car body in as low a position as is practicable, and to afford an efficient but yielding and elastic connection between the car body and the axle boxes for the journals of the wheels which ultimately support the weight of the car and its load, the connections through the truck structure from the car body to the wheels being such as to prevent the shocks en-

countered by the wheels from being transmitted to the car body which is thus rendered easy riding and comfortable for the passengers. The structure is such, however, as to afford an efficient draft union or connection from the wheels, to which the propelling force of the motor is applied, to the car body, which is to be propelled along the track. The construction is also such that the flexibility and elasticity in the internal connections in the truck structure also tend to relieve the car body from shocks arising from the application of the motive power to the wheels and of the restraining power of the brakes in starting and stopping the car. \* \* \*

"The truck \* \* \* is made up of three principal components, namely:

"*First*, the truck frame which controls the position of the axle boxes, and is supported upon the axle boxes, through the intervention of springs over each axle box, which I will call the axle box springs.

"The *second* principal component is the bolster, which is a strong rigid transverse beam, pivotally connected at the middle of its length with the car body, which rests directly upon it.

"While the *third* principal component comprises the parts which afford the yielding and elastic connection between the first and second components, namely the truck frame and bolster, such that an adequate connection is afforded between the two to sustain the bolster and car body on the truck frame and wheels while absorbing and preventing the transmission of shock from the latter to the former.

"Referring now to the construction more in detail of each of said principal components, and taking up *first* the truck frame, said frame is in the general form of a rectangular frame surrounding the two pairs of wheels, and having two side frames outside of the wheel gauge, one at each side of the truck. Each side frame consists essentially of a longitudinal beam at some height above the wheel journals, having near each end yokes or

axle box pedestals, each in the form of an inverted U, with the axle box embraced between the vertical sides of the pedestal, and capable of moving vertically therein, but having no appreciable movement relative to the axle boxes in horizontal direction. An axle box spring is interposed between the top of each axle box and the crown of the corresponding pedestal to sustain the truck frame upon the axle box while permitting a yielding or spring-cushioned vertical movement of one relative to the other. \* \* \*

“The two side frames at the two sides of the truck are also connected near the middle of their length, and between the peripheries of the wheels of each pair, by transverse beams called transoms, there being sufficient space left between the two transoms to accommodate the bolster.

“The *second* principal component, namely the bolster, is a transverse rigid beam lying between the transoms of the truck frame and having its middle portion above the level of said transom, and provided with a pivotal support for the car body, while at the ends the bolster extends to a point below the level of the side frame of the truck, and has a suspensory connection therewith by the appliances, making up the third principal component of the truck, the length of the bolster in the part comprised between the side frames being a little less than the width of the space between the side frames and the width or thickness of the bolster in the direction lengthwise of the car being a little less than the width of the space between the transoms, so that while the bolster is confined within the space between the transoms and side frames of the truck frame which limit its relative movement in any direction, except the vertical, in which they guide it, the said bolster is, nevertheless, capable of having a slight movement in any horizontal direction relative to the truck frame on the suspensory devices which connect the two.

“The *third* principal component, namely, the yielding and elastic appliances by which the bolster is suspended from and connected with the truck

frame, is as follows, and I will, for convenience, describe the connection at one end only of the bolster, as that at the other end is precisely the same.

“The end of the bolster which, as before stated, is below the longitudinal upper part of the side frame, rests upon the middle of a semi-elliptic spring, which lies below and approximately parallel with the side frame of the truck, thus being outside of the wheel gauge and with its ends near the axle box pedestals of the truck frame. Each of the said ends of the semi-elliptic spring is connected with the side frame above it by a link which derives its support from the side frame, and springs are interposed between the point of support of the links on the side frame and the point of support of the semi-elliptic spring on the link so as to afford vertical elasticity in the connection between the semi-elliptic spring and the side frame, the connection being such, furthermore, as to afford a capacity for swinging movement of the link relatively to the side frame in any direction, so as to accommodate movements of the bolster relative to the truck frame in the direction either lengthwise of the car or transverse thereto, or in any horizontal direction as may result from such longitudinal and transverse movement.”

Each end of the bolster is supported on the middle of a semi-elliptic spring arranged lengthwise of the truck and located just below the upper truck chord or frame. The ends of this semi-elliptic spring are supported on the lower ends of links or hangers, which extend upwards therefrom through openings in the upper truck chord or side frame and are supported on the top of that frame. The semi-elliptic springs and the weights sustained by them are spring-supported on the side beams of the truck frame. This spring support includes spiral springs interposed between each end of the links and the side frames of the truck frame. The supporting links are pivotally or yieldingly connected

with the side beams of the truck frame, so that they may swing with relation thereto, and there is a provision for a swinging movement of the bolster and semi-elliptic springs both in a direction transverse of the truck and lengthwise of the truck.

Claim 13 is as follows:

“13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.”

The elements of the claim are:

The side frames,

The semi-elliptic springs movably and resiliently suspended from the side frames,

The bolster secured to the semi-elliptic springs.

Claim 81 is as follows:

“81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described.”

Claim 81 refers to the same elements as claim 13, but is more specific and definite with regard to the means by which the semi-elliptic springs are “movably and resiliently suspended” from the side frames, which means are mentioned as links and springs combined with said links.

The construction of the truck of the patent being understood, its mode of operation easily appears.

When the motors start the truck, the lower ends of the links and the semi-elliptic springs remain stationary, relative to the forward movement of the truck,

until the transoms, which are a rigid part of the truck frame, have moved forward against the bolster (upon which the car body rests), whereupon the transom and bolster form the means for imparting movement to the car body. This enables the semi-elliptic springs and their supports (the link springs) to continue to act freely as *spring supports for the car body*, performing their several functions without hindrance *from the car movement*. The springs are free to act as spring supports during this operation, without being involved as a part of the *drawing* or car-moving mechanism, nor are they or the supporting links subjected to any of the strains of propelling the car.

When in starting the car the bolster and the transom come together, the upper ends of the links may cease to move longitudinally (relative to the truck frame), but their lower ends still continue to swing free, like a pendulum, and being universally pivoted at their upper ends, their lower ends swing through their own greater amplitude. THIS, WITH THE AID OF THE SPIRAL SPRINGS ON THE LINKS, GIVES THAT FREE SWINGING, UNIVERSALLY JOINTED, CUSHIONED MOTION, WHICH MARKS THE SUCCESS OF THE TRUCK IN SUIT. The jar or shock of sudden starting of the truck is cushioned and softened before it is communicated to the car body. The jar and shock of the sudden stopping of the truck is likewise cushioned and softened. When the car strikes an obstruction, a depression in the track, or a crossing, the jar is softened or cushioned before it reaches the car body. In fact, in whatever direction there is strain or jar or shock, it is relieved and softened by the free swinging movement of the bolster and the semi-elliptic springs with the spring-like support, either transversely, or longitudinally, or diagonally, as the case may be.

The Brill patents show a "chair" connecting the bolster ends with the semi-elliptic springs. Another detail may be mentioned. The bolster has three points of support for the car body. The car weight may come upon the pivotal connection with only rubbing contact on the side plates; or it may come upon the side plates with only a draft connection at the centre pivotal point. These features are not involved in this case.

## 2. Divisional Patent No. 627,900.

This patent shows a truck having the same general structural elements and mode of operation as the truck of the first patent. The difference lies only in the construction and arrangement of the spring links, which afford the movable and resilient connection between the bolster and the semi-elliptic springs on the one hand and the truck frame on the other hand.

The pivotal joint in the link enables the semi-elliptic springs to swing transversely without bringing any torsional strain upon the links. That is, while the upper member of the links becomes inclined to the vertical during this transverse swinging movement of the semi-elliptic springs, the lower end of the link may remain vertical, and thus continue to afford during the swing of the car body a *square bearing* for the end of the semi-elliptic springs, so that the end bearing does not tip laterally in its swinging movement, it being rigidly connected with the end of the bolster.

A spring is interposed between the lower end of the link and the bearing for the end of the semi-elliptic spring. The semi-elliptic spring is mounted on the lower member of the link below the horizontal pivotal point between the two link supports. The upper member of the link is so connected with the side frame of the truck as to be capable of swinging transversely or longitudinally as may be required; the connection shown is by a universal or ball and socket joint.

Claim 13 of this patent is:

"13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described."

*Mr. Livermore*, as to the structure shown in the two patents in suit, testified as follows (Rec., p. 504):

"Briefly summarized, the features of construction and arrangement that essentially characterize the Brill truck are the truck frame supported upon the wheel journals, having side frames outside of the wheels and above the wheel axles; the transverse bolster between the two pairs of wheels having free vertical movement and lateral and longitudinal play in the truck frame; the semi-elliptic springs, one at each end of the bolster, lying at the outside of the wheels beneath the side frames of the truck frame and the spring links suspending the ends of the semi-elliptics from the side frames and having universal movement to accommodate the swing of the bolster and the spread of the semi-elliptics incident to their spring action.

"The foregoing elements make a unitary structure or structural combination, every feature of construction and arrangement of which is essential for the proper co-action of all the parts to attain the results that the truck is intended to produce.

"By this construction and arrangement the springs of the system, and especially the semi-elliptic springs, combined with the spiral springs of the spring links by which the semi-elliptics are suspended from the side frame, not only contribute to the easy riding of the car body by ab-



sorbing the shocks that would otherwise be transmitted from the wheels of the car body, but they serve very efficiently to relieve the truck structure of *internal strains* that are incident to various of the constructions of the prior art, and *by their conjoint action accomplish more* than the sum of their individual actions or effects, which might be obtained if the same elements were incorporated in other arrangements in a truck structure."

Also, on page 94:

"According to my understanding, the gist of the invention of the first Brill patent, No. 627,898, lies in the entire organization of the truck, comprising the truck frame, the bolster and the intermediate appliances connecting the truck frame and bolster, and not in any one element thereof.

"Since, however, trucks have commonly been made comprising a truck frame and a bolster, and intermediate connections, I should consider that the truck of the first Brill patent was characterized mainly by the nature of the connections between the bolster and the truck frame, namely, by the semi-elliptic springs and the springs and links suspending them from the side frame, and in the structural character of the truck frame and bolster which adapt them to the structural combination with the said connection.

"As to the second Brill patent, No. 627,900, the invention, as I understand it, involves that forming the subject of the first Brill patent, but is an improvement thereon, the gist of the improvement, briefly stated, consisting in the jointing of the links forming part of the connection between the bolster and the truck frame, and in the structural arrangement of the links relative to the side frame, consisting in supporting the links upon the side frame and having them pass down through the large openings in side frames, which accommodate the universal swinging movement of the links on the side frames."

## ADVANTAGES OF THE TRUCK OF THE PATENTS IN SUIT.

The requirements of electric truck practice with pivotal trucks have been referred to above. They may be expressed more fully as follows:

For high speed and for climbing steep grades, four motors are often required.

The utmost possible traction (that is, grip or adhesion of the wheels on the rail).

A short wheel base for turning curves.

Low-hung cars are a necessity.

For the comfort and safety of passengers, cars must be easy riding.

The "pounding" of the trucks on the rails must be reduced to the greatest possible extent.

(The "pounding" of the wheels of a heavily loaded electric car on the rail joints is one of the most serious problems of street railway practice. The wear on the rails is very severe, far exceeding the wear on the rails of steam railroads. It is a source of very heavy expense in operating a road.)

Two experienced electric railway men testified to the successful operation of trucks of the patent in suit on their respective roads, and that these trucks meet all the most exacting truck requirements.

(These witnesses, by "27-G" trucks, refer to the truck of the *Brill patents in suit*, and by "14-B-3," to the *Peckham truck* here complained of, which trucks, as Mr. Akarman says, "are practically identical in construction; I mean from a practical street railway man's standpoint.") (Rec., p. 422.)

*Walter E. Harrington* had charge of the Camden, N. J., system, and had been connected with electric roads since 1889. (Rec., p. 456, etc.)

He testified (Rec., p. 459, etc.), as follows:

"A. The early development of railway rolling stock was along the lines of longer cars, and the invention of the Maximum Traction truck, so called, was the result of this demand, brought about by the two controlling factors; first, you get a truck that would radiate under bodies and that would admit of use of one motor only. The Maximum Traction equipments in the early days were confined almost exclusively to relatively slow speed equipment.

"The necessities dictated having the car body as close to the ground as possible, in order to avoid the high step from the ground to the platform of the car, and also to provide that the car would go under bridges and the usual overhead construction usually present in cities and towns.

"Q. 15. State any *new* requirements of the business which came into the business *after the adoption of the Maximum Traction truck*.

"A. The Maximum Traction truck was found to be quite destructive to track. The development of trolley roads into suburban districts brought about the requirements of *still higher speed, increased power*, which was not found in the Maximum Traction truck, being limited to use of two motors per car, and it was found that the truck was not safe to run on the high speeds required, in view of the frequent derailments of the Maximum Traction truck under these higher speeds, due to the smaller wheels and small tractive qualities.

"Q. 16. What was the net traction of the Maximum Traction type?

"A. The tractive effort on the Maximum Traction truck varied from 65 to 85 per cent. of the total traction.

"Q. 17. What new and beneficial features did you find in the Brill 27-G, which you first began to use in 1899, and the Peckham 14-B-3 in 1900, as compared with the Maximum Traction type and the new requirements of the business?

"(Objected to as irrelevant, leading and as

containing an assumption in the use of the word 'new.')

"A. The 27-G Brill and 14-B-3 Peckham trucks filled the requirements in that they permitted the truck to radiate under the car body having a 4-foot 6-inch wheel base, with the motors hung out and away from the axles, and away from the center of the truck; that is, the motors were not mounted between the bolster and the axle.

"Four motors were permitted, thus giving the added power required to propel the cars at the higher speed and longer runs for the suburban business. The trucks also, by reason of being pivoted centrally, resulted in the car riding more smoothly and using all the traction available—using the entire 100 per cent.

"Q. 18. How are the 27-G Brill and the 14-B-3 Peckham trucks as to easy riding qualities?

"A. There is very little difference in the riding qualities of these two trucks. If anything, the Peckham was the easier riding truck in that the more crosswise motion was permissible in the Peckham 14-B-3 truck. In comparison with the St. Louis center pivotal double truck the difference in operation is very little.

"Q. 19. Compare the Brill and Peckham trucks mentioned with the Maximum Traction with respect to easy riding.

"(Objected to as being wholly irrelevant.)

"A. The center pivotal trucks in all instances were markedly easier in riding compared to the Maximum Traction truck.

"The adoption of the center pivotal truck as represented in the 27-G Brill and 14-B-3 Peckham marked a *very substantial and necessary development in the use of railway trucks for trolley purposes.*

"Q. 20. In considering the comparative ease of riding between the old Maximum Traction and its successor, the truck here in controversy, what part did the difference in spring arrangement between the two types play?

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("The use of the word 'types' is objected to as indefinite and misleading.)

"A. The Maximum Traction truck depended for its spring action upon the axle having the small diameter wheels upon a spring set in the pedestal box, the pivotal point being so near and adjacent to the tractive axles that the spring action was very unsatisfactory, resulting in throwing various irregularities in track and the motions resulting therefrom into the car body.

"The center pivotal truck, having the bolsters supported on elliptical springs, the ends of which were hung in series through spiral springs, absorbed the motions caused by the irregularities in track to such an extent as to make a marked difference in the riding of the car.

"Q. 21. Can you state whether or not there is a difference of rhythm and of action in the elliptic and spiral springs in the type of truck in suit?

("Same objection to the use of the word 'type.'")

"A. It is a well-known mechanical fact that a spiral spring is more active for a given size and capacity than an elliptic form of construction of spring. Furthermore, the smaller a spiral spring is the greater its responsiveness. In order to illustrate, taking a given sized spiral spring and comparing its activity or responsiveness to two springs (spiral) whose combined capacity is equal to the latter, the two springs will be more active and responsive than the larger spiral spring of equal capacity.

"The combination of the relatively like spiral springs at the end of the elliptic springs results in reducing the jars and variably motions, due to the difference in rhythm between the two springs.

"The Maximum Traction truck has only spiral springs."

Harry H. Adams testified (Rec., p. 433), that he was superintendent of shops of the Baltimore street railway system, operating about 1555 equipments;

and that he had had experience with Maximum Traction trucks and with the type of trucks here in controversy, both of the Brill and Peckham make.

He testified (Rec., p. 434, Q. 5, etc.), as follows:

"Q. 5. Have you, within the last 8 or 10 years, observed any changes in the street railway practice and its requirements in relation to speed, motive power, length of cars, etc.?"

"A. The tendency has been with most of the roads to increase their speed and also the length of the car body, and the practice in regard to electrical equipments or motive has been to go to the four-motor equipment per car.

"Q. 6. What are your longest car bodies?"

"A. I have had experience with car bodies which have been 30 feet 5 inches and 32 feet, respectively, over corner posts. The former in Baltimore and the latter upon the North Jersey Street Railway Company's system.

"Q. 7. What is your highest speed?"

"A. At present we do not get a speed of much more than 20 miles per hour, maximum. We are contemplating, however, the installation of some equipments that will run at least 40 miles per hour.

"Q. 8. What connection has larger car bodies with the adoption of four motors per car? and, in this connection, bear in mind the heavier grades of street railway practice.

"A. With the *four-motor equipment*, it is possible to take care of a heavy car body and distribute the power unit so as to get the best possible results from traction and acceleration. The four-motor equipment is much to be preferred over equal horse power in two-motor equipment.

"Q. 9. What percentage of traction do you get in this type with four wheels of the same size?"

"A. With the four-motor equipment we practically get 100 per cent. traction.

"Q. 10. How about Maximum Traction trucks?"

"A. In the Maximum Traction truck we get about 70 per cent. upon the driving wheels.

"Q. 11. Compare the two types with respect to pounding on the rail joints.

"A. There is considerably less pounding upon the track with the four-motor equipment.

"Q. 12. What about the danger of derailment with the respective types?

"A. There is a great deal more trouble with respect to *derailments* with the Maximum Traction truck than with the other type. The reason for this is the tendency for the small wheels to mount the rail.

"Q. 19. In street railway practice, is the present tendency among the companies towards the last-mentioned type or towards the Maximum Traction type, in ordering new equipments, outside of the cities where the conditions impose the use of the Maximum Traction type?

("Objected to as incompetent and irrelevant.)

"A. I think the tendency is to get away from the *Maximum Traction truck in every case that it is possible to do so.*

"Q. 20. What do you consider the practical advantages of the type now here in suit over the Maximum Traction type?

("Same objection, and as containing an assumption.)

"A. The ease of riding is one of the principal features of this type of trucks due to the fact that it is possible to use a better spring arrangement. Then the possibility of using four motors as against two, allowing for a considerable gain in the acceleration of the car; also the getting away from the tendency of the Maximum Traction to derail.

"Q. 21. What is the importance of a short wheel base in trucks having wheels all of the same size?

"A. With a short wheel base it is possible to radiate the wheels between the side sills of the car without necessarily raising the car to an objectionable height in regard to the step."

("Same objection.")

## THE BRILL TRUCK TOOK THE MARKET—ITS SALES.

The testimony referred to above shows that the developments of the street railway business required a new type of truck and that the Brill 27-G truck completely met these requirements. Its sales were, therefore, very large. At the time of the taking of the evidence on the *prima facie* case, March 30, 1905, they had reached 7,700 trucks (Record page 60, Q-13). Up to July 5, 1905, over 8400 had been sold. At \$250 each this would amount to over \$2,000,000. The sales of the Peckham Company 14-B-3 truck are not fully shown, but the Record shows that in May, 1902, that Company advertised in the *Street Railway Journal* that there were "*over 3000 in use*" (a photograph of this advertisement is at page 163 of the Record).

We will repeat that *Akarman* testified (Record p. 427, Q-36):

"I consider the present type of truck in controversy to be the *highest development* at the present time in the art of truck manufacture."

*Harrington* also testified (Record p. 460, Q 19):

"The adoption of a center pivotal truck as represented in the 27-G Brill and 14-B-3 Peckham marked a very substantial and necessary development in the use of railway trucks for trolley purposes.

"In about 1898, and with the adoption of trucks of the 27-G and 14-B-3 type began a *development in street railway practice* resulting in the investment of millions of dollars which is attributable to no other reason than the opportunity offered by the use of trucks of the above-mentioned description (Record p. 463, Q. 37).

"The development of heavy traction work is *purely the results* of the practical demonstration of the financial successes in the use of the double-



truck cars, whose operation was only permitted immediately following the invention and radical departure in truck construction as embodied in the 27-G and 14-B-3 trucks." (Record p. 467, XQ. 50.)

### INFRINGEMENT—THE FACTS.

The construction of the appellee's infringing structure is not disputed. It is shown:

1. By "Complainants' Exhibit, Photograph of Defendant's Car. (See Record, p. 127.)

2. By "Complainants' Exhibit, Drawing of Defendant's Truck." This is found in Rec., p. 128.

3. It also appears in a handsome white metal model offered by the defendant at p. 202, "Defendant's Exhibit, Illustrative Model of Defendant's Truck."

4. See also attached sheet of Photographs.

### How the Peckham Company Began to Infringe.

The first Brill trucks of this type were completed and shipped from their works to California on March 28, 1896. Early in 1897 others of these trucks were sold to a Company in Jersey City, the Consolidated Traction Co. (subsequently the No. Jersey Railway Co.) and were put in use on its road. From the testimony of Mr. Uebelacker (Rec. p. 14 &c.) it appears that just prior to March, 1897, Charles F. Uebelacker was in the employ of that Company as Master Mechanic and then saw "a photograph of the truck." He identifies a drawing in evidence (page 165) as representing the Brill trucks he then saw. In March, 1897, he entered the employ of the predecessor of the Peckham Company as Superintendent of Truck Designing and Manufacture.

In the spring or early summer of 1897, Mr. Peckham, President of that Company, sent him to Newark, N. J., to examine the new type of Brill trucks and make measurements of them. He then directed him to get up "a design similar to the one he inspected."

He was then instructed by the Peckham Company to build an order of trucks for the Consolidated Traction Co., in accordance with the design which he had made after he had inspected and measured the Brill trucks of that Company at Newark. He began to design these trucks in May or June, 1897. In June, 1897, he applied for a patent covering the broad features of the new Brill truck and assigned his application to the predecessor Peckham Company, his employer. This assignment is in evidence at Record page 171, marked "Uebelacker Patent Assignment."

....*Edward G. Price*, a former employee of both the Peckham Companies, testified (Record p. 478) that he went into the employ of the predecessor Peckham Company in September, 1898, and remained with the new Company. At that time "the Peckham Company had not begun to build their 14-B-3 trucks" (Q., 7). It built some No. 15 and 16 "or Jersey Special" trucks shown at pages 154 (upper cut) and 155 (upper cut). These trucks, though bearing a different shop designation, disclosed the same features, so far as we are now concerned as the 14-B-3 Peckham truck.

He testified that he proceeded to design the 14-B-3 truck (page 480, Q. 14) but that it did not differ, for the purposes of this case, from Peckham's earlier Number 15 and Number 16 trucks. The first sale of the 14-B-3 truck was some time in 1899, which was after the Peckham Company *had carried on and lost its contest in the Patent Office* and Brill had established over Peckham his priority of invention and had obtained his

patents here in suit for the truck in controversy. (Page 482, Q. 17.)

After the Peckham Company had designed its 14-B-3 truck, it proceeded to sell trucks of that designation (page 481, Q. 24, 25).

*Mr. Price* testified that subsequently *Mr. Peckham* directed him to design a new truck to "compete with Brill 27-G," as "the Court may decide that the 14-B-3 truck is an infringement of the Brill 27-G truck." (P. 481, Q. 20.) He thereupon designed the Peckham 14-B-6 truck, which was a different type of truck; "it did not have half-elliptic springs longitudinally arranged and suspended from the side frames." (P. 481, Q. 26.) It is shown on the upper cut of the photograph at p. 163. The 14-B-6 truck appears not to have sold well (p. 481, Q. 25) and THE INFRINGING TRUCK CHIEFLY CONSTITUTED THE PECKHAM COMPANY'S ENTIRE PIVOTAL TRUCK BUSINESS.

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### THE APPELLEE'S STRUCTURE INFRINGES.

We understand that the appellee does not contend that its structure does not infringe upon claims 13 and 81 of the parent patent in suit and that infringement of claims 13, 14, 15 and 17 of the divisional patent suit is not seriously questioned. We will consider the subject of infringement.

It will be remembered that the two patents in suit consist of a *parent* patent, covering the general features of this type of truck, and a *divisional* patent, which relates mainly to the specific construction of the links which support the ends of the semi-elliptic springs from the side frames. They are to be read together—the *general features* from the parent patent, and the *specific embodiment of the links* from the divisional patent, precisely as if the two patents were one.

(*U. S. ex. rel. Steinmetz v. Allen*, 192 U. S. 543.)

We may give a homely but correct illustration: The parent patent, covering the *broad features* of the truck and also a *specific embodiment* of the spring links, may be viewed as a jointed *fishing rod*. The broad features are the two lower joints; the specific embodiment is the tip. In considering the divisional patent we view it in connection with the parent patent—it is as if we removed the tip of the parent patent and substituted the tip (the specific embodiment of the spring links) of the divisional patent—thus making the rod again complete (from both patents).

The appellee's structure contains the three principal components of the parent patent, viz.: the truck frame, the bolster and the yielding and elastic connection between the truck frame and the bolster, such that an adequate connection is afforded between the two, while shocks which would otherwise be transmitted from the wheels to the car body are absorbed, so that the car body is made easy riding and comfortable for the occupants. These are the features of claims 13 and 81.

The identity between the truck of the parent patent and appellee's truck in respect of the first two components (the truck frame and the bolster) is too obvious to require further consideration. As to the third principal component, *Mr. Livermore* testifies as follows (Rec., p. 85):

“The *third* principal component of defendant's truck, *namely*, the yielding and elastic appliances for connecting the bolster and truck frame, the same as in the truck of the first Brill patent, are composed of semi-elliptic springs which lie below the longitudinal beams of the side frames outside of the wheel base, and approximately parallel with the said beam, the bolster resting at each end upon the middle of the semi-elliptic spring at the

corresponding side of the truck, while the ends of each semi-elliptic spring are near the axle box pedestals and are connected with the side frame by links, one at each end of the semi-elliptic spring, which links derive their support from the side frames and have springs interposed between their point of support upon the side frame and the point of support of the semi-elliptic spring on the link, so as to afford vertical elasticity in the connection between each end of the semi-elliptic spring and the side frame. In defendant's truck, furthermore, the same as in the truck of the first Brill patent, the connection of the links to the side frames is such as to afford capacity for *universal swinging movement of the links*, so as to accommodate the movements of the bolster relative to truck frame, *in either the longitudinal or transverse direction, or in any resultant of movements in these two directions*, and so as to accommodate the spreading of the semi-elliptic spring as it is flexed in performing its spring action.

"As appears from the foregoing analysis, defendant's truck clearly comprises the same essential components as those of the truck of the first Brill patent, combined and organized and operating in essentially the same way and producing the same results."

\* \* \* \* \*

"Obviously defendant's truck contains the subject matter recited in both of the above-quoted claims [13 and 81], namely, the side frames, the semi-elliptic springs, a cross bolster secured to the said springs, said semi-elliptic springs being 'movably and resiliently suspended from the side frame,' as recited in claim 13, and the specific devices by which they are thus movably and resiliently suspended being links and springs combined with said links as specifically referred to in claim 81, and the general organization and operative relations of all the said elements in defendant's truck being essentially the same as in the truck shown and described in the first Brill patent.

"Specifically the links and springs employed

as the movable and resilient suspension for the semi-elliptic springs from the side frames in defendant's truck differ in the structural location of the springs from the construction shown in the two Brill patents, although this difference in structural arrangement does not affect the function or operative relation of the same to the remaining elements, which is the same in defendant's truck as in the truck shown in the two Brill patents.

"In defendant's truck the spring forming part of the suspension for the semi-elliptic spring from the side frame is interposed between the upper end of the link and the upper part of the side frame instead of, as in the first Brill patent, between two parts of the link vertically movable one relative to the other, or, as in the second Brill patent, between the lower end of the link and the end of the semi-elliptic spring, which rests upon said interposed spring. In all of these arrangements, however, the primary and essential function of the spring is to afford vertical elasticity in the connection between the end of the semi-elliptic spring and the side frame of the truck frame from which it is suspended by said connection, and I therefore regard the difference in location of the spring as entirely immaterial so far as the subject matter referred to in claims 13 and 81 of the Brill patent is concerned.

"In defendant's truck, the link, like that forming the subject of the second Brill patent, is made in two parts pivotally connected together by a joint having a longitudinal horizontal axis, so that the transverse swinging movement of the bolster and semi-elliptic springs may take place *without bringing torsional strain* upon the semi-elliptic springs, which may remain substantially horizontal during the swinging movement, which would cause the upper parts of the links to assume an inclined position.

"Defendant's trucks, therefore, *embody the distinctive feature* forming the subject of the second Brill patent containing the subject matter referred to in claims 13, 14, 15 and 17 of second Brill patent."

*Mr. Livermore* proceeds (p. 88) to consider the defendant's truck in connection with each of the claims of the second patent in controversy, 13, 14, 15 and 17, to which the attention of the Court is asked.

The subject of infringement will be further treated below (p. , etc.) in connection with the Uebelacker-Peckham patent under which the appellee's trucks were built and under which the appellee justifies, where it will appear that the language of that patent brings the truck therein disclosed within the proper interpretation of the patents in suit.

Infringement is further shown, beyond question, we think, by the direct piracy of the appellant's truck, together with the Peckham Company's attempt to secure a patent covering its broad features and varying from its precise construction of the spring links only by a slight but purely evasive variation, differing in no way mechanically from the spring links of the Brill divisional patent.

These further arguments as to infringement cannot be clearly made until the history of the Uebelacker-Peckham patent is considered, together with the Brill-Peckham Interference in the Patent Office.

### THE DEFENCE.

The entire defence consists of some twenty patents set up by way of anticipation and the testimony thereon of James H. Freeman.<sup>1</sup>

<sup>1</sup> It cannot be said that his expert qualifications *in this art* were of a very high order. At page 207 of the Record, it appears that he had spent some eight years as an Examiner in the Patent Office in charge of the two classes of hydraulic or printing applications. His knowledge of car trucks appears no more than that of an ordinary person of mechanical tastes and observing disposition. He had as a young man, visited some railroad shops on two occasions. It did not appear that he had ever seen in operation the truck in controversy.



The patents discussed by this witness were offered in evidence at page 200 of the Record. Some were for car trucks, some for carriage springs and some for motor suspension, etc. There is no evidence that any of the truck devices disclosed in these patents (except Brill & Curwen) were ever used. Some of them are quite fantastic and carry their uselessness on their face.<sup>2</sup>

### **CERTAIN OF THE PATENTS PRODUCED BY AP- PELLEE WERE TOO LATE.**

As has been said, the first complete drawing of the Brill truck of the patents in suit was made on December 30, 1895 (Record, p. 399. See testimony of *W. S. Adams*, Record, p. 394, etc.). On March 28, 1896, completed trucks of this construction were shipped from the Brill Works to California. Consequently, the following patents relied upon by the expert witness Freeman are too late to be admissible in evidence:

Baker, January 2, 1896, No. 553,298.

Peckham, July 7, 1896, No. 563,685.

Cooke, December 7, 1897, No. 595,045.

Brill and Curwen, August 30, 1898, Nos. 610,118 and 610,119.

This would also exclude defendant's "MODEL THYNG 1845 Patent," in so far as it shows the link of this Peckham Patent, 563,685.

Certain patents put in evidence by the defendant were not referred to by its expert witness, and may be disregarded:

<sup>2</sup> Mr. Justice Shipman in the truck case of *Brill v. Third Ave. R. Co.*, 103 Fed. Rep. 289:

"The testimony of the defendant's expert himself as he goes through the history of the art, and thereby points out what the patentee's combination did, as compared with previous efforts to do something, shows that the patented improvement was patentable."



Taylor, three patents.

Block, 1889 patent.

Boughton, 1892 patent.

Two patents now relied upon were not even offered in evidence in the North Jersey case:

Buck, 1891 patent.

Overbagh, 1870 patent.

This will appear from the opinion of Judge Bradford in the Circuit Court of the District of New Jersey on a petition for a rehearing of that case, the petition for which set up these patents for the first time (124 Fed. Rep. 526).<sup>1</sup>

The opinion of Judge Lacombe in the Circuit Court for the Southern District of New York (129 Fed. Rep. 139) shows that the patents to Beach and to Davenport & Bridges and also the File Wrapper and Contents of letter patent in suit 627,898, were set up by the defendants for the first time in that case and had not been offered in the North Jersey case.

The four Brill Circulars are not admissible evidence as there is no proof of their publication or of any date of publication.

These observations as to certain parts of the evidence which were ~~always~~ open to the defendant and were produced and offered for the first time in this case, are made only because the defendant's expert witness and counsel appear to rely quite as much upon this new evidence as "completely anticipating" the invention of the patents in the suit as they do upon other prior art patents which they depended upon in the North Jersey case and in the earlier stages of this litigation.

It would hardly be profitable to follow the witness

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<sup>1</sup> In *Mast, Foss & Co. v. Stover Manufacturing Co.*, 177 U. S. 489, it was said: "The fact that such anticipating devices were not called to the attention of the prior court is likely to open them to suspicion."

Freeman in his description of the various remaining structures which he finds in the prior art. Most of his evidence is mere description of the earlier structures.

His summary of the results of his examination into the prior art are, however, interesting. As to no less than seven of these patents he expresses the opinion as they "completely anticipate" the parent patent in suit. Thus:

*Buck Patent.* He says of it (p. 186) that "without any change in the construction or any modification of the devices shown and described in the Buck patent, the disclosure of this patent, in my opinion, constitutes a complete and unequivocal anticipation of the subject matter of claims 13 and 81 of the first Brill patent in suit."

*Davenport & Bridges.* As to this he says (p. 189): "This disclosure clearly constitutes a full and complete embodiment and anticipation of the subject matter of the claims in question."

*Haskins Patent.* As to this he says (p. 191): "Haskins's construction constitutes substantial embodiment and anticipation of the subject matter of the claims in question."

*Thyng.* As to this he says (p. 192): "The Thyng patent shows every feature of the claims in question with the slight exception of extensible elliptic connection between the ends of the semi-elliptic equalizing springs and the side frames of the truck frame."

As to *Romans* (p. 192) and *Adams* (p. 192) he makes the same statement as with respect to *Thyng*.

*Brill & Curwen.* As to this he says (p. 187): "The disclosure of the Brill & Curwen patent considered by itself constitutes a complete embodiment of the subject matter of the claims in question."

He concludes his opinion as follows (p. 195):

"The Thyng, Romans, Adams or Baker constructions, with the movably supported and resilient link connections shown in either of the patents to Spencer & Stidolph, Haskins, Peckham, Overbagh and Beach, used in place of the non-resilient connections between the semi-elliptic equalizer springs and the side frames of the truck, would constitute complete and unequivocal embodiments and anticipations of the subject matter of each of the claims 13 and 81 of the first Brill patent."

As to the second patent in suit, he runs through about the same earlier patents and then states as follows (p. 198):

"The subject matter of claim 13 would likewise be embodied in and anticipated by the Thyng, Romans, Adams and Baker constructions if such elastic and articulate connections as are found in the Cooke, Haskins, Buck, Davenport & Bridges, Overbagh and Beach patents were employed in place of the articulated but non-elastic connections by which the semi-elliptic load carrying equalizer bars of each of the Thyng, Romans, Adams and Baker constructions are suspended from the truck frames. As I have before pointed out, such substitution is clearly within the province of the ordinary mechanic skilled in the art of truck construction."

The sufficient answer to such testimony is that it is opposed to the following principle stated by Mr. Justice Blatchford in *Lyman v. Arnold*, Fed. Cas. 8632:

"In fact, the more numerous and diversified the forms and arrangements which existed prior to Lyman's, the more certain is it that none of them reached the principle of Lyman's, because his principle, once practically developed by him, superseded the prior art structures."

Also the language of Mr. Justice Shipman in the electric truck case of *Brill v. Third Ave. R. Co.* (103 Fed. 289):

“The testimony of the defendant’s expert himself as he goes through the history of the art and thereby points out what the patentees’ combination did as compared with previous efforts to do something shows that the patented improvement was patentable.

See *Topliff v. Topliff*, 145 U. S. 156, which was a carriage spring case, and held as follows:

“It is not sufficient, in order to constitute an anticipation of a patented invention, that the device relied upon *might, by modification*, be made to accomplish the function performed by that invention, if it were not *designed* by its maker, nor *adapted*, nor *actually used* for the performance of such function.”

Of these 20 earlier patents certainly not one discloses the *combination* of the patents in suit—the structure. But an expert witness, not particularly experienced in this art—its exacting requirements and difficulties—testifies that from various parts of old patents the truck in suit may be constructed by an “ordinary skilled mechanic.” This is perhaps ascribing greater skill than usual to that well-known person in patent litigation. The theory has been found not to be entirely satisfactory to the courts, though much favored by the experts. It seems particularly far-fetched here. What, for instance, would be the result if one such had been ordered in 1895 to construct an operative and successful high speed electric railway truck from a view of the patent to Buck or to Davenport & Bridges or to combine Beach with Thyng.

The same argument was advanced in *Carnegie Steel Company v. Cambria Iron Company*, 185 U. S.

403, where some useless and abandoned processes and the "skilled mechanic" argument were brought forward by the defendant, but the Court said that it was "*too late*"; that where thousands of the most skillful mechanical minds had failed for years to see the new invention in the old devices, it was absurd to say that any "ordinary skilled mechanic" could have seen it.

It will be observed that there is a close analogy between this Carnegie case and the case at bar. Both cases relate to industries of large magnitude, employing many highly trained minds. In both industries the need was well understood and most pressing. In both many trained minds were working on the problem with a full sense of its importance. In both there was a prior art showing nothing but failure, and, at last, came the final success. In both there was also the competitor who had failed to make the invention, and who knew only enough to appropriate it when made and to seek the destruction of the patent on it in the courts.

If it required only the skill of an ordinary mechanic to take these elements from these various old patents and create the "*epoch-making*" truck of the patents in suit, why is it that Mr. Peckham, manufacturer of trucks only and shown by this record to be a truck inventor and patentee, did not design this truck, though as soon as he saw it he proceeded to adopt and sell it, to the exclusion, practically, of all other types?

And why did not so capable an inventor as Walter S. Adams turn his face in the *right* direction when he invented the truck of his patent No. 538,858? Or why did Mr. Curwen, or Mr. W. G. S. Baker, the Baltimore truck builder, both of whose truck patents appear in this Record, fail to grasp the opportunity.

These are not the "ordinary skilled mechanics" whose work is considered not to rise to the dignity of inventive effort; these are among the inventors and

pioneers in the art through whose inventive talent, with others, the electric street railway art in America leads the whole world. And yet they all failed. Does it not seem futile to say that any "ordinary skilled mechanic" could have gone to Thyng or Haskins, or Graham, or Heffernan, or Peckham, and by combining their various parts, constructed the Brill truck here in suit?

The trade were seeking a truck to do the work, but failed to find it. They knew that when found it would bring great financial rewards. They knew, too, of these earlier patents—certainly of Adams and Baker and Taylor and the like, issued since the days of electricity. But they all failed except Mr. Brill. Is it not a safe test of patentable invention to bring together out of old elements a combination which is new, which no one else ever thought of, but which the leaders in the art consider as "epoch-making," as "a radical departure in truck construction," and which meets at once almost universal adoption?

The "skilled mechanic" argument overlooks the magnitude of the electric truck problem and the highly exacting conditions which it must meet. The "skilled mechanic" is hardly able to grasp such a problem. The moment he can, he rises out of that class. It is a problem of a truck designed on sound engineering principles and made strong enough to carry a load of fifteen tons at a speed of 40 miles an hour on short curves and with frequent and abrupt changes of grade, stopping and starting at every cross street, often with imperfect track conditions, which will yet carry the passengers with comfort and wear the rails and jar the car body as little as possible. It would seem to be a very large problem and not easy to understand—to the ordinary mind.

That the production of anything really new and really valuable in this art would seem to require a distinctly inventive mind is shown by the extremely slow

growth of the steam truck art which has required 50 years to become standardized. Only of late years has this been accomplished by "The Master Car Builders."

Men of experience in the electric railway business, the managers of large systems, such as Harrington, Akarman and H. S. Adams, witnesses in this case, understand the situation. They have testified here that it is their belief that the Brill Truck was "epoch making"; that it made possible the developments in electric railways; that it was a necessary factor in bringing about the electric railway development immediately following its invention. *Experto crede*. Such men know truck requirements and difficulties. They would be surprised to be told that any "skilled mechanic" could have got up this Brill Truck. Certainly they would believe that in the law of patents it is the last step which wins. Shall we match against their experience the guesses of an inexperienced expert as to what "completely anticipates?"

And to these considerations we add the convincing testimony of Peckham, one of the largest truck builders of the country, who, as soon as he heard of the Brill truck, filed an application for a patent to his company covering its broad features, and began to sell it in large quantities. Can any evidence be more persuasive than this?

We will now take up the prior art patent which has been most considered in this case:

### **THE THYNG PATENT.**

This patent is more than 50 years old. It was issued in 1845. It relates, of course, to *steam* railroads and was obviously intended for small freight cars to carry light loads. There is no evidence that such a truck was ever built or used.

The patent is found at p. 243 of the Record.



The structure has two side frames to which the pedestals are rigidly attached. The side frames support semi-elliptic springs by hangers. These hangers are fastened rigidly into the side frames. They are double jointed; both joints give motion *only in a transverse* direction. When the elliptic springs flatten out under the load, the hangers, having no capacity of movement in a *longitudinal* direction, must be put under strain according to the weight of the load. Normally they permit no longitudinal movement. If there is any, it is only by forcing the hangers out of their natural position and function. This might, or might not, work with a few tons of load on a steam road at low speeds. It certainly would not work with a five-ton car body and some ten tons of passengers, running over somewhat irregular tracks and with sharp curves and changing grades at 40 miles an hour.

To demonstrate the inoperativeness of this truck in the electric railway art, the appellants' counsel employed *Louis T. Pyott*, a first-rate mechanic and truck inventor and familiar with patents, and directed him to construct, by himself under the Thyng specification and drawings, a pair of full size Thyng trucks and to experiment with them in such a way as to enable him to form an intelligent opinion as to whether or not that truck was a practical truck *in this art*. He built a pair of Thyng trucks and put them under a 28-foot car body and loaded the car body with eighty men, constituting only an average load for such a car and much less than the load that such a car is intended to carry at times. It was rather a short car body. Thirty-six feet is nearer the present standard.

Mr. Pyott's testimony will be found in Record, pp. 407 to 419 and 440 to 456. Photographs of the experimental trucks are at pp. 147 and 148 of the Record, the latter showing the links in a bent condition under the weight of an empty car body.



These experiments were fairly and independently made by a disinterested mechanic. This had not been questioned. *The trucks and car body were put at the disposal of appellee's counsel for such investigation as they might desire during the taking of their testimony.* (See Record, p. 419.)

Motors were not placed on these trucks, as they would have had to be reorganized for that purpose; the Thyng patent (1845) disclosed a *steam railway truck*; therefore, the trucks were not actually operated as electric railway trucks. As to this *Mr. Pyott* testified (Record, p. 412, Q. 36) that he did "not consider that it would have been safe to run this car with the eighty men on it." His testimony shows the entire unfitness of this truck for modern electric truck practice.

*Walter S. Adams* (a life long truck man and truck inventor) testified to the entire inoperativeness of these Thyng trucks (p. 472, Q. 3 to p. 476).

He points out the *mechanical insufficiency* of the structure, and at Q. 10 testifies that the "result of operating this pair of Thyng trucks under the car body in actual service under prevailing conditions" would be that "the *shackles would break* if this truck was put in actual operation."

A drawing produced by him and marked "Adams Illustrative Drawing," introduced at p. 476, and found at p. 150, shows, to a demonstration, the uselessness of the Thyng structure in this art—the manner in which the wearing parts of the Thyng links would wear or break or sheer off, when they are forced into an abnormal position.

Much has been made of the theory that "looseness of parts" of the links of the Thyng patent would provide that *longitudinal* motion of the links which, admittedly, is necessary in the operation of the trucks here in controversy and which is *characteristic of both com-*

*plainants' and defendant's trucks.* But the theory was never tenable, for obvious reasons, and the defendant's expert witness in this case *has not ventured to adopt and testify as to such theory.* In view of the absence of such testimony, it may have been unnecessary for us to offer proof that such looseness of parts does not exist and that, even if it does, it does not make the Thyng truck operative, but such evidence was adduced by us, in order that the court might be enlightened on that subject and that argument.

Furthermore, the Thyng patent itself shows capacity only for *lateral* or *transverse* motion. Thus it states:

"The bolster is allowed to move endwise freely between the two girts [transoms] in the truck frame; this motion, which gives the car body its *lateral* motion, is governed by the *shackles*.

"What I claim \* \* \* is the mode herein described of hanging the car body and governing its *lateral* motion."

As there is no *provision* in the Thyng truck for *longitudinal* movements of the links, the flattening of the semi-elliptic spring under load places an *abnormal* strain on them. This is shown in the "Pyott Photograph No. 2" of the Thyng trucks taken after a car body, with only a partial load, had been placed upon them. Mr. Pyott testified that, with only eighty passengers on the car, the distortion of the Thyng links was so great that it was not deemed safe to run it. (Rec., p. 412, Q. 36.)

There is another important consideration. It arises from the difference between steam and electric railway practices. In the former the car is drawn by a locomotive; the car truck is but a roller upon which the car body moves when drawn by the locomotive.

On the other hand, in electric practice, the truck

is moved by motors and carries or draws the car body with it. There is a moment when the wheels begin to move forward, while the inert mass of the loaded car body remains behind; it is the moment before the transom has come into contact with the bolster. In operating *Thyng* trucks, if it could be done, with an electric motor, as soon as the truck begins to move, the motion would be transferred from the side beams to the ends of the links which sustain the half-elliptic springs. From the ends of the links the forward motion would then be transmitted to the ends of the half-elliptic springs supporting the bolster, and through the half-elliptic springs to the still stationary weight of the car body, which has not yet begun to move. There is, therefore, in the *Thyng truck* a moment in which the entire *drawing strain* of the car and load comes upon the connection between the links and the half-elliptic springs. This is a longitudinal, backward *strain* upon the links, which ceases only when the forward motion transmitted through the half-elliptic spring to the bolster shall have been sufficient to bring the transom against the bolster, thereby imparting a forward motion to the car body.

On the contrary, in the complainants' and defendant's trucks, when the truck begins to move, the jar to the car body is cushioned by the (*longitudinally*) swinging spring links, and no drawing strains come on the connections between these links and the half-elliptic springs during the moment which elapses while the transom is moving forward into contact with the bolster. (See Rec., p. 56.) That is equivalent to saying that the latter trucks are constructed upon correct *mechanical principles*.

### **Thyng Truck as Regarded by Other Practical Men.**

*John N. Akarman* (p. 426):

"Q. 32. Based upon your life-long experience

in the trolley business, state whether or not you consider the construction of this *Thyng* model such as would meet the modern practice that you have described.

"A. I consider the device, as shown in the model, as crude and impracticable, and not adaptable to the practice or requirements in electric railroads."

Also, at p. 425:

"Q. 24. Look at the model of the *Thyng* truck and state whether or not you find provision therein for such strains and a cushioning against such strains.

"A. I do not."

*H. H. Adams* testifies (p. 440):

"RDQ. 54. You are in the market for a large number of modern high-speed trucks at the present time; state whether or not you would accept a bid for trucks made like the *Thyng* model which opposing counsel has called your attention to.

("Question objected to as manifestly incompetent, irrelevant and without the issues.)

"A. I should not want to consider a truck with a link suspension of that character."

*W. E. Harrington* testifies (p. 463, Q. 33):

"Q. 33. In your opinion, would you consider that the truck shown in these photographs is a sufficient practical truck for use in electric traction, as practiced to-day, with large cars and heavy loads, and high speed, etc., as you have described?

("Objected to as irrelevant to any issue in this case.)

"A. No."

*W. G. Price*, a practical truck builder, testifies to the inoperativeness of the *Thyng* truck at pp. 483, etc., beginning with Q. 35.

*W. S. Adams* testifies that the Thyng model ("Defendant's Exhibit, Thyng Truck") does not correctly represent the structure of the Thyng patent (p. 543, Q. 72).

It has been urged by the appellee's counsel that the experiments with these trucks were unfair because the defendant was not permitted to witness them. Surely the complainant's fairness cannot be called in question because it chose to make the first experiment itself. After that, as we have stated above, the trucks were placed at the disposal of the defendant before it had closed its testimony.

To show "looseness of parts" in the hangers, the patent drawing has been scrutinized and lines discovered which are said to indicate permissible looseness of parts. It is then argued that with this looseness of parts, provision is made for the flattening of the semi-elliptic springs under load pressure and consequent longitudinal movement of the hangers. This would seem hardly enough to provide a suitable hanger for electrical trucks under the conditions of weight and speed we have referred to. Such hangers made with looseness of parts would quickly wear out and soon bend or break. That such a provision suffices for the necessary longitudinal action of the spring suspension would seem to be idle talk.

It is true that no electric motor was ever placed upon these trucks and it is true also that they were never run. But the Thyng truck was *not* an electric motor truck and had no provision for mounting motors. Had motors been mounted, it would have reorganized the truck. The cars were not *run* because the mere imposition of a partial load demonstrated their unfitness to meet the required conditions.

Other criticisms made by opposing counsel on these experimental trucks and particularly the state-

ment of Pyott to the effect that the Thyng truck was a practical truck in steam road service *at the time of its invention* for a speed of from 12 to 20 miles, do not appear to require any comment.

We shall show below that when the *Peckham Company* was seeking to patent this truck and the Thyng patent was cited as a "reference" against its application, its attorney wrote the Patent Office that "this claim is not met by *Thyng* of record, since the Thyng patent \* \* \* particularly does not show spring supports sustaining the links—which support the ends of the elliptic springs—from the upper beams. This is an important feature in the applicant's organization."

### THE BUCK PATENT.

This patent is found at p. 254 of the Record.

The defendant in the North Jersey case did not deem this patent of sufficient importance to set up as a defence.

*W. G. Price*, a truck designer, testified to the construction of the truck of this patent (Record, p. 488, Q. 55; p. 497, XQ. 85). He pointed out that its bolsters rest on half-elliptic springs which are placed approximately in line with the wheels. These springs are connected by shackles to what are called transverse springs which are supported by a stirrup hung from cross ties of the truck frame in the center line of the truck. The transverse springs marked Q R in the patent drawing are to have sufficient power to hold up their end on ordinary occasions, in contact with the lower side of the intermediate cross ties; but to have sufficient flexibility to be brought into use as springs on extraordinary occasions, that is, when the load is not sufficient to press the transverse springs Q R away from contact with the intermediate cross ties, they

would not act as springs at all. When the load is sufficient to depress the ends of these springs below the cross ties, inasmuch as the springs are supported at their middle point on a pivot which is below the center of gravity of the car body, the car body would tilt to one side or the other, so that only one end of these springs would be free from the cross ties and the other end would not act as a spring at all. If the springs Q R were brought into action, the vertical movement of the bolster due to inequalities of the track, would cause the ends of the springs Q R to drop alternately below the cross ties and then to rise and strike the cross ties, which would be a very inefficient spring action and would produce worse riding conditions than if these transverse springs Q R were entirely omitted and the longitudinal springs were hung directly from the truck frame.

W. S. Adams at p. 535, Q. 34, testifies to this structure. He points out that it was intended for steam car trucks with a long wheel base—in excess of 7 feet. The use of the transverse semi-elliptic springs would prevent the use of a motor on the axle hung within the wheel base without making the wheel base considerably more than seven feet. If the motor were mounted outside the wheel base, the whole structure would be of an impossible length. Should the transverse springs come into use at any time as springs, they being supported at the center on a bolt T, there would be a rocking motion tending to overturn the car by shifting its center of gravity. The longitudinal springs of the Buck patent are not disposed over the *pedestals* as in the patents in suit, but immediately over the wheels themselves. The testimony of this witness is too long to quote here. At pages 548, 549, of Record he produced a drawing marked “Enlarged Patent Drawing,” which was offered in evidence at page 548 and is reproduced at page 549.



*Akarman* was examined as to the structure of "Defendant's Exhibit Model Buck Truck." He testified (Record, p. 435, XQ. 38):

"A. In answer to that, I will say that the model shown is what I generally term a *freak truck*, having no single qualification to recommend it.

"XQ. 86. Don't you think you are rather partisan?

"A. I don't. I don't think you could find a single railroad man in the country who would take a given number of those trucks as a gift, providing he was compelled to operate them. I wouldn't."

and at p. 426:

"Q. 33. Please look at 'Defendant's Exhibit, Buck Truck,' and state whether or not that construction is suitable for modern electric street railway practice?

"A. It is not practicable for many reasons; the construction precludes the equipping with electric motors; it also necessitates *too great a distance between wheel centers, and is in every way incomplete and not mechanical, and in no way adapted* to the requirements."

### THE OVERBAGH PATENT.

This also was not in the North Jersey case.

The testimony of a practical truck man as to this device is too long to quote here. See *W. G. Price*, p. 485, Q. 48, and p. 496, XQ. 79, etc.

At p. 485, Q. 49, etc., he testifies "that defendant's exhibit Model Overbagh spring hanger" is not "made in accordance with the Overbagh patent" and gives his reasons for this opinion.

*W. S. Adams* testified at p. 541, Q. 72, etc.; p. 590, XQ. 399.



### THE HASKINS' PATENT.

As to this, *W. S. Adams* testified, p. 544, Q. 77, in reference to "Defendant's Exhibit Model of the Thyng Truck" purporting to show a part of the Thyng 1845 truck combined with the Haskins 1885 spring link, that *longitudinal* motion of the hangers under load pressure on the semi-elliptic springs could only be possible by reason of "looseness of parts" in the hangers, which he considered as "unmechanical."

The Haskins' patent discloses a spring link for the support of a carriage spring. Its spring link has no provision for longitudinal motion either in the patent drawing or in the model purporting to illustrate it. It could not be substituted for the purpose of giving universal motion in the support of the semi-elliptic springs of the type of the patent in suit.

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### THE PECKHAM MOTOR HANGER PATENTS.

We have pointed out above that the Peckham patent No. 563,685 was issued after the invention of the patent in suit.

Referring to the Peckham patent 464,253 and Fig. 3 thereof, *W. G. Price* at p. 492, Q. 66, points out that the construction is such that the bolts "J" cannot swing, but remain constantly in a vertical position.

Also *W. S. Adams* at p. 558, Q. 172, expresses the opinion that "the bolts referred to are not free to swing from their upper ends.

Obviously this device taken from a non-related art, would not have taught anything to the "skilled mechanic" in the way of truck construction in 1895.

**BRILL & CURWEN PATENT 610,118.**

(Dated Aug. 30, 1898.)

This patent is found at p. 311 of the Record and also its structure appears on the sheet of drawings at the end of this brief, second column. It is an entirely different class of electric truck. Its elliptic springs are *transversely* disposed. They are *full elliptic*. They rest upon a spring plank and support the bolster. The equalizing bar of the Brill & Curwen truck is a rigid bar, while in the patents in suit it is a half-elliptic spring. In the Brill & Curwen truck the springs swing only transversely; in the truck in suit they swing both transversely and longitudinally.

This patent was issued 32 months after the invention of the truck of the patents in suit and 29 months after the first of such trucks had been *actually built and shipped*. Even the application for the Brill & Curwen patents was filed November 3, 1896, which was more than seven months after the shipment of the first trucks built under the patents in suit. According to these dates, therefore, the Brill & Curwen patent is not a part of the prior art.

The disclaimer in the parent patent in suit relating to this Brill & Curwen patent must, of course, have its proper effect. To that extent, and to that extent only, the Brill & Curwen patent is part of the prior art. It is as follows (p. 2 of 627,898, 1, 119):

“The location of the semi-elliptic springs outside of the wheel-gage on each side of the truck, together with the location of the links for supporting the semi-elliptics closely adjacent to the ex-boxes, and the swinging of said springs from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck-transoms within the wheel-gage. These general features of con-

struction, however, are embraced in an application, filed by Samuel M. Curwen and myself on the 3d day of November, 1896, Serial No. 610,902, and therefore I do not claim the same herein."

The most obvious thought as to the effect of this disclaimer is that of Judge Bradford in *Brill v. North Jersey Railway Company*, 124 Fed. 778, where he points out the applicant for this patent could hardly be taken to have disclaimed away the gist of his invention. The opinion of the court in that case, after quoting the disclaimer, quotes from the Brill & Curwen patent a description of the structure covered and concludes as follows:

"The Brill & Curwen patent does not embody or disclose the combination of patent No. 627,898, but the above language taken from its description satisfactorily explains the meaning of the alleged disclaimer in a later patent. All that was meant was that the patentee did not claim that the mere location of the semi-elliptic springs 'outside of the wheel-guage,' and location of the spring links 'closely adjacent to the axle box,' involved novelty or patentable ability. The alleged disclaimer in no wise affects the right of the complainant to a decree as to patent No. 627,898."

We might point out that the language of this disclaimer is impossible to understand so far as it refers to "the location of the semi-elliptic springs outside of the wheel-guage on each side of the track," and this for the simple reason that the Brill & Curwen structure has no semi-elliptic springs located outside of the wheel-gauge, but has full elliptic springs disposed within the wheel-gauge. The disclaimer can, therefore, only be applied to the location of the links closely adjacent to the axle boxes. This feature is found in the Brill & Curwen patent and it is the only feature referred to in the disclaimer which is found there.

On appeal (134 Fed. 580) the learned Court of Appeals for the Third Circuit disagreed with Judge Bradford, but, we submit, took an erroneous view of the Brill & Curwen structure. They seem to have conceived their idea of the structure from reading claims 7 and 12 of that patent. The claims, of course, do not describe the device, but claim it as described. We submit that the opinion of that court was in error in holding "that the only difference between the combination shown and claimed by Brill & Curwen and the principal combination of the claims involved in this suit is that the latter claims call for semi-elliptic springs for connecting the links, instead of equalizing bars." Hardly so. As we have shown above, Brill & Curwen disclose transversely disposed full elliptic springs and a spring plank with a rigid equalizing bar—an entirely different type of truck from the truck of the patent in suit. And that is the position taken in the Uebelacker-Peckham application in the Patent Office. There the Patent Office cited as a reference the Brill-Curwen truck as illustrated in a Brill Circular which is an exhibit in this case, marked "Brill 1st Circular," entitled "A perfect Passenger Truck." This circular shows a cut of a Brill & Curwen truck. In response to a communication from the Patent Office to the applicant for the Uebelacker-Peckham patent, the applicant wrote the Patent Office as follows (p. 747 of the File Wrapper of that patent, made a part of this Record):

"The Brill circular, 'A Perfect Passenger Truck,' does not show a truck embodying the combination of claim 16, since in the Brill truck there are no half-elliptic springs arranged between the upper and lower longitudinal beams of the side frames, the said half-elliptic springs supported at their upper ends by link appliances flexibly suspended from the upper side beams. Brill's truck (Brill & Curwen) embodies a spring plank arranged transversely of the truck, supporting full

elliptic springs which in turn support the bolster, the said spring plank being itself supported on equalizing bars suspended by spring appliances from the upper side beams of the truck. *This is distinctly a different organization from that of the applicant.*" (Italicized in original copy.)

The comparison of the *language* of certain claims of Brill & Curwen with that of certain claims of the first patent in suit is entirely futile. The claims are mere words. The *structures described* are entirely different organizations.

Again, Mr. Livermore points out, pp. 506 and 507, that even if we assume that this Brill & Curwen truck performs all of the functions of the Brill patents in suit, still the truck of the patents in suit makes a *single element*—the longitudinally disposed semi-elliptic springs—perform the work of *three distinct parts* or elements in the Brill & Curwen truck, namely: rigid equalizing bars, the spring plank and the full elliptic springs interposed between the spring plank and the bolster, and that this is *an advance in the art* because it substitutes four elements for six.

*W. S. Adams* testifies that the Brill & Curwen truck is much heavier and much more expensive than the Brill truck in suit (p. 562, Q. 193).

Also, that its links have no *longitudinal* swing (p. 546, Q. 91, 92).

The patents we have thus discussed appear to be the principal ones. It is not profitable to discuss the rest of them at any length.

They, and indeed all the patents set up by the defence, may be divided into three classes.

1. Trucks of about the same date as the truck in suit, but a little earlier, which are practical trucks

though of a different class from the truck in suit, such as Adams, Baker and Taylor.

2. Structures which on their face seem complicated and impossible, such as Romans, Overbagh, Buck and Block, &c.

3. Spring hangers taken partly from the carriage are, such as Haskins and Boughton, or from the motor suspension arts such as Peckham, or from the truck art such as Beach and Graham; or the locomotive art such as Heffernan and Longstreth, none of which we submit are instructive to the truck designer. They have ben considered by the complainant's witnesses. We refer to the testimony of W. S. Adams as sufficient, who testifies to the practical lack of adaptability of the various other devices set up. We indicate the places where his testimony will be found.

*Graham*, p. 547.

*Beach*, p. 551, 588.

*Davenport & Bridges*, p. 554, 593.

*Boughton*, p. 556.

*Taylor* (three patents), p. 556, 557.

*Longstreth*, p. 557.

*Heffernan*, p. 558.

*Baker*, p. 558.

*Cooke*, p. 559.

*Romans*, p. 558.

The constant, reiterated statement and contention of Mr. Freeman is that the "ordinary skilled mechanic" would, in the various old structures, see the Brill truck in controversy; the entire defense is based upon it; but the *practical truck man*, *W. S. Adams*, thus refers to that theory. (P. 559, Q. 177):

"Q. 177. Please state whether or not you agree with these statements as to the ordinary skilled mechanic.

"A. I do not agree with this statement. I *am one of the patentees mentioned* and had been working on trucks exclusively for over five years previous to my taking out the patent referred to, in 1895; *it did not occur* to me to make such substitution stated, notwithstanding the fact that *it was a very valuable feature* in truck construction, both *mechanically and financially*, and I do not consider that it would have occurred to any skilled mechanic to make this substitution."

We now take up the

### **Opinion of Mr. Livemore on the Prior Art.**

Mr. Livermore, appellants' expert, fully considered all the evidence of Mr. Freeman. We ask the court's attention to this testimony and simply note the pages in appellant's record where he discusses each of the patents considered by Mr. Freeman:

Brill & Curwen . . . .	506
Spencer & Stidolph . .	507
Graham . . . . .	508
Buck . . . . .	508
Davenport & Bridges	514
Haskins . . . . .	514
Packham (3) . . . .	515
Overbagh . . . . .	516
Beach . . . . .	516
Block . . . . .	516
Longstreth . . . . .	516
Cooke . . . . .	516
Thyng . . . . .	517
Romans . . . . .	517
Adams . . . . .	519
Baker . . . . .	520

He refers to the testimony of Mr. Freeman as follows (Rec., pp. 518, 519, 521 and 522):



"Mr. Freeman, as I understand his testimony, regards the construction characteristic of the Brill truck as lacking in novelty, in view of the combination shown in the Thyng truck and of the knowledge of spring links in various other combinations illustrated in the patents above considered by me, showing spring links. In connection with his consideration of the spring links of the Peckham patent, No. 563,685, used as a motor support, Mr. Freeman says:

'It is obviously within the province of the ordinary mechanic, skilled in the art of truck construction, to substitute this Peckham link for the particular form of links employed in any one of the patents above referred to for connecting the ends of semi-elliptic equalizer springs with the frame of the truck. Take, for example the Thyng construction; the Peckham link is obviously as well adapted for supporting the opposite ends of the semi-elliptic springs of this patent, as it is for supporting the motor in the Peckham patent.'

"There is, however, in the Peckham patent, as well as in the other patents showing spring links, nothing whatever to indicate to the assumed skilled mechanic any desirability of making the substitution referred to, or that any new or beneficial result would be obtained by the combination of spring links with the semi-elliptic springs and the truck frame and bolster as shown in the Brill patents; and an equally natural, if not the only logical substitution, if it were desired to employ spring links such as constitute the motor support in the said Peckham patent, in a truck structure like that of the Thyng patent, would be to substitute them for the nearest equivalent found for them in the old structure, namely, for the semi- and non-elastic shackles, giving a construction such as is exemplified in the Beach patent No. 173,257, above considered by me, which shows a truck similar to the Thyng truck, except that spring link hangers are employed to suspend the bolster from



the truck frame in place of the spring hanger system comprising semi-elliptics and non-elastic links which characterizes the truck of the Thyng patent.

"On the other hand, taking the Thyng patent as the basis, *there is nothing* in the construction there shown, nor in other truck constructions containing a similar spring system, comprising semi-elliptic springs and non-elastic shackles or link hangers, *to indicate to the skilled mechanic* any inadequacy in the spring system, as such; *nor to indicate how such inadequacy could be best remedied* if the attempt to put the truck into practical service should show that the truck was deficient in its spring system, or otherwise.

"*With the solution of the problem before one, as given in the Brill patent sued upon*, it appears as if such solution was attainable from the materials at hand in the prior art by bringing into combination old elements which were previously known in other combinations, but I am decidedly of opinion that in the absence of the knowledge now derivable from the Brill patents and the extensive practical use of trucks embodying the characteristic combination of the Brill truck, there was nothing in the prior art structures, individually or collectively, to lead to the discovery or production of the combination which characterizes the Brill truck.

"It seems to me that this opinion is strongly confirmed by the fact that *in the more than fifty years which elapsed* between disclosure afforded by the Thyng patent and the production of the Brill truck, which up to date appears to be the final solution of the truck problem, it occurred to no one to make the substitutions or changes which Mr. Freeman now asserts are *obviously within the province of the ordinary mechanic* skilled in the art of truck construction; and furthermore, the various trucks produced in the fifty or more years, between the time of the Thyng truck and the production of the Brill truck, and referred to in Mr. Freeman's testimony as showing generally sim-

ilar organizations, do not indicate any progress or growth in the *direction* of arriving at the structure forming the subject of the Brill patent, all of the trucks in the said intervening period being, if anything, more remote from the Brill structure than the one shown in the Thyng patent over fifty years before.

"With the *knoweldge derived from the Brill patents* here sued upon, and from the extensive introduction of trucks embodying the construction shown in said patent, it is *now* obvious that a highly efficient truck can be produced by a structure similar to that of the Cooke, and Brill and Curwen patent, except that in place of the rigid equalizer bars, sand plank and elliptic springs supporting the bolster, semi-elliptic springs or elastic equalizer bars, as Mr. Freeman calls them, are employed.

"The Cooke, and Brill and Curwen patents, however, seem to me to show conclusively that what Mr. Freeman *now* points out as an obvious fact was not known to, or recognized or discovered by, the inventors of the structures forming the subject of these patents at the time when the structures forming the subject of said patents were invented by them, as it is inconceivable that they should have adopted the more complicated and cumbersome construction shown in said Cooke, and Brill and Curwen patents if it were recognized that all of the results and advantages accruing from said construction, and more, could be attained by the simpler construction forming the subject of the Brill patents here sued upon, by a combination involving a less number of elements to perform all of the functions and some additional ones, as was pointed out by me when I first considered the truck of the Brill and Curwen patents in the early part of my answer to the third question."

He expresses his final opinion thus (p. 522):

"For the foregoing reasons, I am of the opinion that the truck shown and described in the Brill patent here sued upon and referred to in the

claims thereof,, in issue in this case, is substantially different from each and all of the structures of the prior art, and is not anticipated or fore-shadowed in any way in the prior art structures."

## **PATENTABLE NOVELTY AND INFRINGEMENT.**

### **Further proof from the Uebelacker-Peckham application and the Brill-Uebelacker interference.**

Further evidence on the patentable novelty of the Brill truck in suit—evidence which is most persuasive, and which we submit ought to be quite conclusive—will be found in the File Wrapper of the Uebelacker-Peckham application for letters patent on its truck and of the Brill-Uebelacker interference. We will consider the subject.

The Brill truck in suit was invented in December, 1895; an application for a patent on it was filed July 3, 1897. In the spring of 1897 the Peckham Company sent their mechanical engineer (Uebelacker) to examine and take measurements of the new Brill trucks of this type at Newark. He copied the trucks and on October 25, 1897, applied for a patent on his imitation, assigning his application to his employer, the predecessor Peckham Company. This application came into interference with the pending (and prior) Brill application, which interference proceedings are now to be considered. References to the record are given above, at p. . At the time this interference was declared, the Brill patent was ready for issue.

It will be shown:

1. That the Uebelacker-Peckham application was for a patent covering the *structure of the Brill truck* here in controversy.

2. That the Patent Office cited against that application the principal patents for truck structures which are now set up against the validity of of the patents here in suit (Thyng, Brill and Curwen and Adams).

3. That the (Uebelacker-Peckham) applicant thereupon took the position in the Patent Office that those patents *did not disclose the subject-matter of its application*, and that, notwithstanding them, it was entitled to a patent on the *broad features* of the truck here in controversy. The Patent Office *acceded to this contention* and confirmed the patentable novelty of the subject-matter of the Uebelacker-Peckham application.

4. That an interference was thereupon declared between the Brill application for the letters patent in suit and the Uebelacker-Peckham application, which was *necessarily based upon the identity of the subject-matter of the respective applications* involved in the interference.

If these facts be made to appear, they establish that the *present contention* of the Peckham Company is *directly contrary* to the position which it took and insisted upon in the Patent Office on the *precise questions* here in controversy.

The *privity* between the old and new Peckham companies is admitted. (Record, p. 233.)

As the Uebelacker-Peckham patent was issued [so far as it relates to matters discussed here] substantially in the form of the original application, we will refer to the *patent* instead of to the application.

The drawings of the Uebelacker-Peckham patent show the *broad features* of the truck in controversy. (See Record, p. 330, and sheet of cuts at the end of this Brief.) The specification of that patent undoubtedly describes the same truck.

The object of the improvement is stated in the patent, not as a mere *improvement* in trucks, but "*to construct a truck—particularly adapted for carrying heavy car bodies in high-speed service—which shall support upon it a car body, through the instrumentality of a suitable centre-bearing bolster, in such manner that longitudinal, as well as transverse movement of the car body and supporting bolster, with relation to the truck structure, may be provided for, so as to neutralize shocks imparted to the truck before such shocks can be transmitted to and affect the car body.*" (See patent, lines 16-28, p. 1. Record, p. 333.)

The links suspending the half-elliptic springs are described as being "*adapted to swing, thus providing for changes in the span of the [half-elliptic] springs, produced by varying loads, and for the swinging of supporting said springs and the car body bolster resting thereon longitudinally as well as laterally with relation to the truck frame.*" (Patent, lines 127-133, p. 2.)

Referring to the file wrapper of the Uebelacker patent:

After the filing of the Uebelacker-Peckham application, the first action of the Patent Office was a rejection of almost all the claims on a reference to the *Thyng* patent. One claim was rejected upon a reference to the "*Brill 2d Circular*," which illustrates the truck of the *Brill & Curwen* patent, 610,118 (here in evidence.).

In answer to a part of this rejection, the attorney for the applicant stated (page      of the file wrapper):

*"This special combination is not shown by Thyng or by Brill [2d Circular, disclosing Brill & Curwen truck]."*

On January 4, 1898, the Patent Office wrote Uebelacker's attorney again, stating that the *Thyng* patent was a "reference" as to certain of the claims and re-

jecting those claims. In response to this, on January 17, 1898, Uebelacker filed an amendment cancelling certain claims, and adding a new claim, as follows (p. 743, file wrapper):

"1. The combination, in a car truck, of the side frames comprising pedestals, upper duplex beams and lower beams between the pedestals, axle boxes in the pedestals, springs between the axle boxes and the tops *support the bolster, and spring supporting links* which pass between the members of the duplex beams and are supported from their upper edges."

The only difference between this claim and the Brill structure shown in patent 627,898 in suit, lies in the fact that in this claim the upper beams are *duplex* (in two parts), while in Brill these beams are solid. This new claim 1, just mentioned, also discloses lower side beams, which are mere braces connecting the lower part of the pedals, and having no relation to the matter in controversy.

Following this amendment, the Patent Office (p. 744 of file wrapper) stated that the Uebelacker-Peckham claims were in condition for allowance, therein including this claim 1. Thus, the applicant had then taken the ground and succeeded in establishing its position that there was nothing in the "references" (Thyng, Adams and Brill & Curwen) to prevent a grant to it of a patent for a truck which is substantially identical with the truck here in controversy.

Following this statement of the Patent Office, Uebelacker-Peckham filed an amendment, dated February 2, 1898, in which certain new claims were inserted, together with the words (p. 745 of file wrapper) "*and preferably duplex,*" showing that Uebelacker considered his duplex construction of the upper beam the same as the Brill solid beam with a hole through it for the swing of the link.

In this amendment, claim 12 was added, which described many of the essential features of the truck of the patents in suit, viz.:

"12. In a car truck, the combination, with the side frames, each comprising two pedestals and upper and lower beams, of a car body supporting bolster, a plurality of half-elliptic springs arranged between the upper and lower longitudinal beams of the frames and connected to the ends of the bolster, link appliances connected to the ends of said half-elliptic springs, and flexibly supported at their upper ends on said upper beams."

Then followed the rejection, February 9, 1898 (page 746 of the file wrapper), of some of the claims added in this latter amendment (including this claim 12) on a reference to the Thyng patent, the Adams patent, 538,858, and the "Brill 1st Circular," entitled "A Perfect Passenger Truck," which is offered in this Record at page , Deft.' Rec., and which has a cut of the Brill & Curwen truck.

On February 25, 1898 (file wrapper, p. 747), the applicant objected to the rejection of claim 12 on the first two references, and wrote the office in the following words:

"The *Thyng* patent cited for this claim is not an answer, particularly because the links which support the ends of the half-elliptic springs are not *flexibly supported* at their upper ends on the upper beams of the truck frame. Besides the Thyng truck frame does not comprise upper and lower longitudinal beams connecting pedestals together. The feature of flexibly supporting the suspending links at their upper ends on the upper beams of the truck frame clearly differentiates this claim from the Thyng patent. [Italics as in original.]

"*Adams*, also cited for claim 12, does not anticipate the claim because, first, there is in the



Adams truck *no car body supporting bolster*, the support for the car body comprising rub plates located above the upper beams of the truck frame; secondly, the links from which the half-elliptic springs are suspended from the upper beam of the truck frame are not *flexibly supported* at their upper ends on the upper beams of the truck frame. These two features clearly differentiate claim 12 from the Adams patent."

Again, when claim 12 was added by amendment, a new claim, 16, was also added (page 745 of the file wrapper), which covers the essential parts of the truck in controversy. It was in the following words:

"The combination in a car truck of side frames comprising pedestals, upper and lower side beams connecting the pedestals, axle boxes in the pedestals, a bolster, half-elliptic springs which support the bolster, *links and spring supports* therefor supported *from the upper beams* and .... *supporting* the half-elliptic springs between the upper and lower beams."

This new claim 16 was also rejected on the *Thyng* patent and the same "Brill 1st Circular," entitled "A Perfect Passenger Truck," which discloses the *Brill & Curwen* structure. (It contained several of the essentials of claim 13 of Brill patent, 627,898, and is, in some aspects, *broad*er than that claim since the links are not, as in claim 13, described as *movable*.) In response to the rejection of this claim 16, the attorney for the Uebelacker-Peckham application wrote the Patent Office as follows (file wrapper, p. 747):

"This claim is not met by *Thyng* of record since the *Thyng* patent does not show lower side beams connecting the pedestals, and particularly does not show *spring supports* suspending the links—which support the ends of the elliptic springs—from the upper beams. This is an important feature in the applicant's organization.



"The Brill Circular 'A Perfect Passenger Truck,' does not show a truck embodying the combination of claim 16, *since in the Brill [Brill & Curwen] truck there are no half-elliptic springs arranged between the upper and lower longitudinal beams of the side frames, the said half-elliptic springs supported at their ends by link appliances flexibly suspended from the upper side beams.* Brill's truck [Brill & Curwen] embodies a spring plank, arranged transversely of the truck, supporting full elliptic springs, which, in turn, support the bolster, the said spring plank being itself supported on equalizing bars suspended by spring appliances from the upper side beams of the truck. *This is distinctively a different organization from that of the applicant.*"

#### **Further Reference to the Course of Proceedings in the Interference.**

Prior to the declaration of interference and about February 3, 1898, Uebelacker was notified by the Patent Office that his claims were in a "condition for allowance," but would be held back for a possible interference with other pending applications. Then Uebelacker proceeded to insert certain new claims, one of which was claim 12 [which subsequently became count 7 of the interference]. This claim was thereupon rejected on a reference to the Thyng patent, No. 4726, of 1845, and Adams, 538,858, of 1895, which have been much relied upon by appellee as anticipations in the case at bar. Uebelacker opposed this rejection on the ground that these were not pertinent references and submitted an argument in support of his opposition to the rejection of that claim. (This appears at p. 747 of the file wrapper and is further referred to in the testimony of Mr. Livermore, Rec., p. 522, Q. 5.)

The examiner thereupon withdrew his objection to claim 12 as based on these references, but again re-

jected claim 12 on the Brill catalogue in evidence "No. 27-D. The Universal Truck." Immediately thereafter, without action by Uebelacker, he was notified (p. 747, file wrapper) to amend his application in seven days in view of a probable interference. Then followed an amendment by Uebelacker inserting additional new claims and arguing against the pertinency of the said Brill catalogue as affecting his claim 12, and further stating that his invention (Uebelacker's) was made before the date of the letter from David Young printed in said Brill catalogue.

Thereupon (May 10, 1898), the examiner, apparently convinced by Uebelacker's argument, allowed claim 12, among others, and declared an interference in which claim 12 of the Uebelacker-Peckham application became count 7 of the interference. The first six counts were six claims taken from Brill's applications, and each of these six counts are stated in the declaration of interference to "cover" certain other Brill claims, and also to "cover" certain of the Uebelacker claims. (See Declaration of Interference, pp. 2 to 5. Interference Record offered, p. 44, C. R.)

For the present purpose it will only be necessary to discuss the interference proceedings so far as they relate to claim 13 of the Brill patent 627,898 in suit. (One of the two claims here urged.)

Count 2 was in the language of claim 13 of the original Brill application, and which subsequently became claim 13 of the patent 627,898 in suit.

Count 7 was in the language which was originally claim 12 of the Uebelacker application, which claim is above referred to as covering or relating to the broad features of the truck here in controversy. (It was subsequently cancelled from the Uebelacker application after priority of invention had been awarded to Brill on the broad features of the truck, as not being patentable over Brill.)

Then the parties filed their preliminary statements (the averments of which have been held by McKennan, J., in *Kirk v. DuBois*, 33 Fed. Rep. 252, to be a matter of "decisive significance.").

What was the subject-matter upon which the Uebelacker-Peckham application was trying to secure letters patent? Clearly, the *broad features* of the truck in controversy, as we shall now show.

Claim 13 of the Brill application and claim 12 of the Uebelacker application (which were in the same words as counts 2 and 7 of the interference) are clearly directed to the broad features of the Uebelacker truck.

Uebelacker in his preliminary statement (pp. 778, 779, Int. Rec.) set forth under oath *after the prior art had been cited against him*:

"That affiant conceived the *invention defined by the issue set forth in the official letter of declaration of interference*, and also the *invention covered by the twenty-one claims of his application involved in this interference*, as early as the 15th of July, 1897."

This is obviously a claim to the *broad features* of the truck in controversy, as the statement necessarily extends to the invention of the entire subject-matter of the interference, *i. e.*, the invention of the truck for which both parties were contending.

If it be urged that count 7 of the interference (claim 12 of Uebelacker) included the structural element of the *lower chord*, it is sufficient to reply that all the other counts, 1, 2, 3, 4 and 6, cover the broad features of the trucks *without reference to this lower chord*. These counts were also part of "the invention defined by the issue" in the declaration of interference which Uebelacker stated, on oath, that he had invented.

Upon a technical ground the first interference was dissolved as to certain counts, but it became final

as to counts 5 and 7, and as count 7 included the above mentioned claim 12 of the original Uebelacker-Peckham application covering the truck in controversy, the final judgment in the interference settled that issue.

The dissolution of the interference was under a new ruling by the Commissioner in *Hammond v. Hart* (C. D. 1898, p. 52), made a few days before the declaration of interference. This rule required *verbal identity* in the claims as well as identity in the subject-matter. Formerly the latter only had been required. The dissolution of the first interference was not because the *subject-matter* of the claims differed, but because their precise *words* differed.

There was, then, a re-declaration of interference (p. 895 of Interference Record). This also covered the broad features of the truck. Uebelacker again (p. 901) filed a like preliminary statement. Thereupon priority of invention was awarded to the Brill application.

Clearly, therefore, this interference involved:

1. *Patentable subject-matter* which had already been determined by the Patent Office *to be such*.<sup>1</sup>

<sup>1</sup> It can hardly be argued that the Patent Office prior to the interference had not, upon the contention of the applicant for the Uebelacker-Peckham patent, officially decided that the subject matter thereby disclosed was *patentably novel* over the prior art, and particularly the earlier patents to Thyng, Brill & Curwen, and Adams, the only part of the prior art which the Patent Office deemed it worth while to cite as references.

An interference in the Patent Office is defined as follows (*Hammond v. Hart*, 1898, Com. Dec. 52):

"An interference is a proceeding intended for the purpose of determining the question of priority of invention when two or more parties claim substantially the same *patentable invention*."

*Oliver v. Felbel*, 20 App. D. C. 262.

"In the sense of the Patent Law there can be no interference unless there is *patentable invention* and there are rival claimants of it."

In *Orcutt v. McDonald*, 27 App. D. C. 228, 234, it was held that:

"The question of patentability is not ordinarily regarded as open on appeal to this Court in an Interference Case, but is to be regarded therein as *conclusively established* by the Commissioner of Patents."

It can hardly be argued that the Patent Office prior to the interference had not, upon the contention of the applicant for the Uebelacker-Peckham patent, officially decided that the subject-matter thereby disclosed was *patentably* novel over the prior art, and particularly the earlier patents to Thyng, Brill and Curwen, and Adams, the only part of the prior art which the Patent Office deemed it worth while to cite as references.

This was the position taken by Uebelacker, and we are now concerned only with the question as to what that application contended for in the Patent Office.

2. The scope of the interference issue. The interference covered the *broad features* of the trucks of both applicants, and was necessarily based upon the *identity* of the two structures before the Patent Office, else there would have been no interference.

We submit that we have thus shown that the contention of Uebelacker-Peckham in the Patent Office was directly contrary to the position now taken by counsel for the Peckham Company, the real defendant here.

We submit that the above facts are sufficient to establish beyond question that the Uebelacker-Peckham application was urged for a patent covering the *essential features* of the Brill truck; that the most important part of the prior art *here* set up and chiefly insisted upon was cited in the Patent Office against the allowance of claims for the *broad* invention; and that the applicant then and there took the position that he was entitled to a patent for the *broad features* of the truck, notwithstanding this same prior art.

There can be no question that the interference contest was on the *broad features* of the Brill truck, and that the only question there was as to who was the first inventor of *that truck*. That was certainly what

Brill was claiming (and got), and his opponent must have been claiming the same thing. Priority was awarded to Brill without any contest over the facts, because, while Brill in his preliminary statement carried his invention back to 1895, the Uebelacker-Peckham preliminary statement did not carry his *date of conception back even to the date of application for the Brill patents in suit.*

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### CASES ON THE EFFECT OF INTERFERENCE PROCEEDINGS.

*Thomas & Sons Co. v. Electric Porcelain Mfg. Co.*, 111 Fed. Rep. 923, was quite similar to the present case. There, as here, the defendants derived their title from a defeated applicant in the Patent Office, involved in an interference proceeding with the complainant. Archbald, J., said:

"As to the question of patentability, which is the only thing left, while Locke, or those claiming under him, may not be estopped from contesting it, yet, considering that Locke himself endeavored to obtain a patent for the same identical purpose, *copying the Boch application verbatim*, it does not come with good grace for him, or his assigns, to do so. *Shuter v. Davis* (C. C.), 16 Fed. 565. He also virtually affirmed to its *patentability* in the affidavits of Cahoon and himself, presented to the Court of Appeals in the first interference proceedings."

In *Dickerson v. De la Vergne Refrigerating Co.*, 35 Fed. Rep. 143, which was an application for a preliminary injunction, Lacombe, J., said:

"The force of an interference decision is also sometimes supplied by the doctrine of estoppel; the party who has received a patent, or *who has asked for one*, being estopped from subsequently claiming that the *subject-matter thereof was not patentable.*"

In *Shuter v. Davis*, 16 Fed. Rep. 564, Wallace, C. J., said:

“But it also appears that the defendants were parties in interest in the interference proceedings before the Patent Office between the complainants and Mark Davis . . . . The question of priority having been determined in favor of the complainants in that proceeding is *res judicata*, as between the parties to it [citing cases]. The defense of want of *novelty* does not come with *very good grace* from parties who endeavored to procure a patent to be issued to Mark Davis for the same invention, but is undoubtedly open to the defendants.”

These cases appear to be important and sound. *Some legal consequences* ought to result from the conduct of a party who for a year or more contests in the Patent Office his competitor's right to a patent on a given structure, applying himself for a patent on the same structure, while meantime, as here, continuously pirating his competitor's invention, and when sued setting up the claim that his competitor's device was invalid for want of patentable novelty.

*Mr. Livermore* considered the teaching of the interference proceedings at Record, p. 522, Q. 5.

Much can be learned by comparing the Uebelacker-Peckham patent with the Thyng truck with the addition of links of Haskins. We will consider this subject.

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### **UEBELACKER-PECKHAM PATENT COMPARED WITH THE THYNG AND HASKINS PATENTS.**

The appellee here puts its chief stress on the Thyng 1845, patent in connection with the Haskins carriage and Peckham motor support patents, or the like.



We will show that *without an entire reorganization of both structures* (which would amount to patentable invention), neither could the "springs" of the Haskins patent be incorporated in the Thyng truck, nor could the Thyng truck be embodied in the Haskins structure.

The pertinent part of this inquiry is to determine whether the Haskins and the Thyng patents, when grouped together, as suggested by Mr. Freeman, could produce a structure which corresponds at all with that disclosed in the Uebelacker-Peckham patent and one which would be adapted to operate in the same way and produce the same results as clearly described and pointed out in that patent.

We have fully considered the Thyng patent above. Its specification states that its shackles provide only for a *transverse* swing of the bolster. This does not meet the requirements of the Uebelacker patent. Again the swing of the shackles in Thyng is *below* the side bar and therefore the *long links of the Uebelacker patent are not present*. Nor is the flattening of the semi-elliptic springs under a car load provided for in Thyng. The appellee may urge that looseness in the joints of the Thyng shackles is sufficient provision for this purpose. If it is, it is an accidental and not an intentional provision. That it is not a *sufficient* provision is clearly demonstrated by the *positive provisions* made in the Uebelacker patent for this purpose, and is further demonstrated by the results of Mr. Pyott's experiments with the Thyng trucks, which show it to be entirely absent. Obviously the truck of the Thyng patent was not organized for the service specifically recited in the Uebelaker patent, and it does not respond to the requirements of that patent.

Passing by very many other important distinctions, it does not teach the requirement of the complete and unhindered *longitudinal and diagonal swing* of the



semi-elliptic springs and their hangers, nor has it a link swinging from the *top* of the side frame of the truck, or above it. It swings from *below* it. Further, there is no pretense that it taught the desirability of applying an additional spring (as a spiral spring) between the ends of the semi-elliptic springs and the side frame.

In a word, it fails to suggest any of the *characteristics* of the Uebelacker-Peckham truck.

And, furthermore, it would not be possible, *without an entire reorganization of the Thyng truck*, to incorporate into it such a link as the Haskins wagon link. The appellee has given a physical demonstration of what, in its judgment, one would do (after one had become fully acquainted with the Brill invention) if called upon to organize a truck in accordance with the Thyng patent. This is shown in "Defendant's Exhibit, Model Thyng Truck." No one seems willing to stand sponsor for this so-called model, for Mr. Freeman (Record, p. 194) only says it is "in accordance with the Thyng patent as to its general features." It is inadmissible for any purpose. (See objection, Record, p. 200.) It is incorrectly made. (Rec., p. 414, Q. 54, 55.)

Without going into the question as to the unfairness of this model, as testified to by W. S. Adams (p. 197, Q. 543), owing to the incorporation therein of three separate and distinct forms of links culled from other patents, we only remark that, as constructed, it is absolutely without *suggestion of the desirability* of the essentials of the Uebelacker truck. An attempt is made to provide for them by incorporating in this model, on one end of one of the semi-elliptic springs, one of the Haskins springs. The designer's best judgment resolves itself into the selection of that shown in Fig. 1 of Haskins. The model discloses that, as used, the pivotal point of the Haskins "spring" is far *below* the side frame (making a very *short* link), whereas in the

Uebelacker-Peckham patent it is at the top of the side beam or above it, whereby a *long* link with a slow swing is secured. The pivotal axis of the Haskins "spring" in the model is *longitudinal*, whereby only *transverse* swing of the "spring" is positively provided for in the Haskins patent. The moment the semi-elliptic springs of the model elongate (as they would under the pressure of a superimposed load), whatever looseness there is in this pivotal joint above the spring would be taken up, and the capacity for further longitudinal swing of the "spring" or link (so as to allow the transom to come against the bolster without putting a strain on either the spring or its support and the semi-elliptic spring) becomes impossible.

In the appellee's *reorganization* of the Thyng truck, by adding to it the Haskins link, it has not produced anything which even approximates the essential requirements of the Uebelacker-Peckham patent. It will be observed that the spring of Fig. 1 of the Haskins patent is adapted to swing *longitudinally*, but not *transversely*, of the wagon body.

Appellee may contend that a looseness between the pin *e* and the bolt *c* in Haskins will allow for this, but the same objection is present as in the model. The spring *c*, at the first instance of compression by a load will elongate and take up this looseness; further elongation of the spring *c* makes rigid the pivotal connection between the strap on the side bar *b* and the spring, thus not only preventing further transverse swing, but hindering longitudinal swing as well.

The moment the Haskins structure is analyzed it discloses an inherent want of capacity for substitution in the Thyng truck, so as, in any way, even to approximate the Uebelacker patent. One of the absolutely essential features of a swing bolster truck is that it must be permitted to swing freely and unrestrictedly, *transverse-*

ly of the truck. *In order to have any relevance at all to truck practice*, the spring c, in Fig 1 of the Haskins patent, should have at least the capacity for a decided *transverse* swing relative to the wagon body A; but, as above pointed out, that is impossible in that structure. When the appellee *reorganized* Thyng and put this Haskins "spring" into this model, it threw in this *transverse* swing of the bolster, although not to a proper or practical extent, and the only real and *intentional* swing of the Haskins spring (longitudinally of the wagon) was thereby eliminated.

It is clear, therefore, that neither in the Thyng patent nor in the Haskins "spring" is there any suggestion of the essentials of the Uebelacker-Peckham patent, from which even those skilled in the art could adapt one to the other *without entirely departing from the scheme of organization of either*. It is also clear that, when this adaption was attempted, as the appellee has attempted it, *the structures respectively operate in manner and secure results in operation entirely different from those which can be properly inferred from either the Thyng or the Haskins structures by any allowable process of reasoning*.

It is very clear, then, that the appellee has fallen very far short of success, *even with the Brill patents before it*, in demonstrating that the Brill patents in suit involve nothing but the sum of the functions of these old elements which have been selected from the old art and grouped together. It goes without saying that the appellee did not even conceive that these substitutions could be made *until after it had seen the Brill patents in suit*.

The logical result of this line of reasoning is that since it has been clearly shown that the express statements of the Uebelacker-Peckham patent and the features of construction of the Brill patents in suit are

identical, what is true and applicable to the Uebelacker-Peckham patent in this regard is also true of the structures of the Brill patents in suit. This inference must be more strongly drawn in favor of the Brill Patents, since, as regards the Uebelacker-Peckham patents, the Brill patents belong to the prior art and constitute the first instance of any suggestion of the very things which the appellee now says are most easily deducible from the Thyng and Haskins structures.

In the model of the Thyng truck there has been incorporated one of the motor links of the Peckham patent, 563,685 (which we have shown [*supra*, p. ] to be of *too recent a date* to be relevant to this case). Now it is testified by Walter S. Adams (p. 543, Q. 74) that in the part (motor support) taken from this Peckham patent and incorporated in the model, the springs surrounding the bolts bear against the part of the truck frame through which the bolt passes, and that, for this reason, the motor-supporting bolt in Peckham would not have the capacity for the *free swing* which has been *imparted* to it in this model. The springs are *not arranged in the model* as they are in the patent. If the upper coil spring in the model bore against the portion of the frame through which the bolt passes, the swinging action of the link would be *impeded*. If there be anything in the prior art which suggests even remotely the application of this Peckham bolt to the Thyng truck as a substitute for the Thyng shackles (which is denied), there was no warrant for the defendant *rearranging* the springs in the model so that the bolt would operate differently in the model from its necessary operation in the patent.

So far as relates to the *second* Brill patent in suit 627,900, and the Uebelacker-Peckham patent, it is sufficient to call the court's attention to the fact that the Peckham bolt is not articulated between its ends, so

that, as to this feature of both the Brill and Uebelacker links, that Peckham motor support patent of 1896 has not the slightest relevancy.

These prior patents typify the defendant's theory of substitution. If they cannot, within permissible bounds, be reorganized into the Uebelacker-Peckham truck, under the patent on which the appellee justifies, how can the so-called doctrine of "substitution" have even a remote application to the Brill patents in suit?

It would appear that the interference proceedings we have considered should amount to proof conclusive of infringement. The defendant-appellee *justifies* under the Uebelacker-Peckham patent. The infringing structure follows the construction of that patent. That the Peckham Company, had a long interference contest in the Patent Office for priority over Brill on the same *truck*, would seem sufficient to establish the fact that its truck is identical in subject matter with the Brill truck.

We will consider :

**The identity of the Uebelacker-Peckham patent under which the appellee justifies with the Brill truck of the patents in suit.**

The *claims* of the Uebelacker-Peckham patent do not, of course, *now* cover the *broad* features of the Brill invention; the broad claims thereof were necessarily cancelled as a result of the decision in favor of Brill in the Brill-Uebelacker interference. But a consideration of the *description and drawing* of the Uebelacker-Peckham patent distinctly negatives the defense that the defendant's trucks do not infringe upon the patents in suit. This patent having been issued to the Peckham Motor Truck and Wheel Company, the predecessor of the company here justifying under it, the language of its description and the structure shown in its drawing

become extremely pertinent evidence here on the question of identity.

*We observe, at this point, that this entire subject has been disregarded by the appellee. Although the appellee justifies under the Uebelacker patent, it does not attempt to differentiate the structure described in it from that of the patents in suit. Its position is: We have a patent; we should be let alone. But no presumption of non-infringement is established by the issue of the Uebelacker-Peckham patent.*

The appellee will no doubt contend that the interference proceedings have no bearing except as to priority of invention between Brill and Uebelacker. We think we have shown that they have a much more important bearing than that.

It appears from the express statements of the patents in suit, from the testimony of witnesses, and from the express statements of the Uebelacker-Peckham patent, that there are two main features in both appellants' and appellee's trucks. These features are as follows:

(a) A combination of resilient or spring devices for supporting a bolster on the side frames. These devices consist specifically of a pair of longitudinally disposed semi-elliptic springs, with additional springs (specifically spiral springs) interposed between the ends of the semi-elliptic springs and the truck frame (and these spiral springs may be either on hangers below the truck frame, as in the Brill construction, or between the upper ends of the hangers and the truck frame, as in the Peckham construction). In both instances these springs provide supports for the ends of the semi-elliptic springs, which supports are interposed (mechanically speaking) between the ends of the semi-elliptic springs and the truck frame. This is a specific location of parts whereby a new result is obtained, due

to the different actions of the several kinds of springs employed, at their particular points or positions of location. The semi-elliptic spring is a *slow-acting* spring and responds slowly to the car movements. The spiral springs, located between the ends of the semi-elliptic springs and the truck frame, are quicker in their action and neutralize the slow action of the semi-elliptics, responding quickly to the car movements, which is very desirable. The specific location of the spiral springs (mechanically speaking) between the ends of the semi-elliptic springs and the truck frame not only enables them to absorb quickly any vertical stress placed upon the ends of the semi-elliptics, due to the action of the superimposed load or to the movements of the truck frame, but brings about a conjoint spring action, composed of the *quick* action of the spirals and the *slow* action of the semi-elliptics.

The benefits of this co-operative relationship, and the peculiar spring action resulting therefrom, are fully set forth by *Mr. Harrington* at page 461, Q. 21, etc.; p. 462, Q. 27.

THIS COMBINATION OF SPECIFIC SPRINGS IS CLEARLY SET FORTH IN CLAIM 15 OF BRILL PATENT 627,900 IN SUIT.

(b) Such positive provision for movably supporting the ends of the semi-elliptic springs from the truck frame as will allow for a substantially universal (including a diagonal, a transverse and a longitudinal) swing of both the suspending appliances, the semi-elliptic springs and the bolster, in order to avoid placing any strain upon either the semi-elliptic springs or the suspending appliances, except the weight of the car.

The *intentional* organization of both appellants' and appellee's trucks is such that, considering the truck as a locomotive (which it is, carrying electric motors adapted to exert, as to each truck, anywhere from 50 to over 100 horse power), no part of the enormous



strain to which the truck is subjected (while starting or stopping the car, or by shocks due to the striking of curves, sudden change of grade, obstructions on the track, irregularities in the track, and the sudden reversal of the motors) shall substantially or materially affect either the suspending devices or the semi-elliptic springs.

In other words, in both appellants' and appellee's trucks, the lower end of the links and the semi-elliptic springs are adapted to remain stationary, relative to the forward movement of the truck, until the transoms, which are a rigid part of the truck frame, have moved forward against the bolster; whereupon the transom and bolster form the means for imparting propulsive movement to the car. This enables the semi-elliptic springs and their supports, including the interposed springs *to act freely as spring supports* for the car body, performing their several functions without hindrance from the car movements. As to this, *Mr. Harrington* fully testifies at page 117, Q. 34.

#### **Uebelacker's Patent Compared with the Appellants' and Appellee's Trucks.**

In the appellee's truck there is a pair of longitudinally disposed semi-elliptic springs directly secured to the bolster. The ends of these semi-elliptic springs are supported by devices which include springs interposed between the ends of the semi-elliptic springs and the top of the truck frame. The ends of the semi-elliptic springs are supported upon the truck frame by devices which permit of the *free and intentional* transverse, diagonal and longitudinal swing of both the bolster, semi-elliptic springs and the suspending devices, free from the influences of the truck movements, as above set forth.

The appellants' truck embraces a bolster supported by longitudinally disposed semi-elliptic springs, and



between the ends of these springs and the truck frame are interposed suspending devices which *intentionally* permit the free and unhindered swing of the bolster, semi-elliptic springs and the suspending appliances, longitudinally, diagonally and transversely of the truck frame, and uninfluenced by the truck movements.

It is conceded that the complainants' trucks of the patents in suit involve these two characteristics. They are both equally present in the defendant's trucks. In this connection the Uebelacker-Peckham patent, under which the defendant justifies, will be considered.

That patent says, in stating the object of the improvements:

"The object of the present improvements is to construct a truck *particularly adapted for carrying heavy car bodies in high-speed service* \* \* \* in such manner that *longitudinal* as well as *transverse* movement of the car body and supporting bolster with relation to the truck structure may be provided for, so as to *neutralize shocks* imparted to the truck before said shocks can be transmitted to and effect the car body."

Figures 1, 2 and 3 of the drawings of the Uebelacker-Peckham patent illustrate the preferred form, while Figs. 4, 5 and 6 illustrate what the patent states to be somewhat modified form. "The side frames of the truck comprise yokes or pedestals, 14, upper longitudinal beams 15 and 15a, connecting the pedestals together at the top and *preferably duplex*, and lower longitudinal beam 16 connecting the pedestals together at the bottom." The upper beams while preferably made *duplex* (that is of *two* thin bars juxtaposed) are evidently not necessarily made duplex, but the beam is so constructed, as the patent states at lines 67-69, page 1, as "to permit of the *requisite swing of the links supporting the half-elliptic springs*." The patent further states that "the truck has a short wheel base." In this

aspect it is precisely the same as appellants' patent. The truck has "a swivel plate 26 to which the car body is adapted to be connected in the usual manner."

The Uebelacker-Packham truck also has "*universal links 32*" which support the ends of the semi-elliptic springs 29. The patent also shows spiral springs 39 seated within a recess formed in the side frames and adapted to "*yieldingly resist vertical play of the bolt 34,*" the bolt 34 forming a part of the *universal link* (see Fig. 1).

The Uebelacker-Peckham patent, therefore, states that the operation of the supporting links is identical with that of the Brill patent in suit, in which the spiral springs 34 yieldingly resist the vertical play of the lower portion of the link; that is to say, the ends of the semi-elliptic springs in both the Uebelacker-Peckham patent and in the Brill trucks, and also in the defendant's trucks, are so supported as to resist, yieldingly, vertical play relatively to the side frames. The Uebelacker-Peckham patent goes on to state as follows, lines 41-66, p. 2, (Before quoting this language it is important to observe that it was inserted in the Uebelacker-Peckham application by way of amendment *after the termination of the interference proceedings, and after Uebelacker, his attorney, and the Peckham Co. had had full opportunity for considering at length the Brill applications and the structures disclosed and claimed therein.* q. The language referred to is as follows (p. 2. l. 41):

"In the construction described the suspending devices or appliances for the semi-elliptic springs *are increased in length by supporting the upper ends thereof from the upper edges of the upper side beams and preferably by supporting said upper ends at a distance above said upper edges.*"

The Uebelacker-Peckham specification thus makes the supporting on the *upper edges* of the side beams

(as in the Brill patents) the equivalent of supporting the suspending devices at a distance above the upper edges, the latter *preferably*.

The Uebelacker-Peckham specification continues:

"This is done in the construction of Fig. 1 by extending the springs 39, which support the bolts 34, a distance above said upper edges, as shown. *This lengthening of the suspending appliances is found advantageous, particularly because it gives an easier swinging bolster.* By means of the recess in bracket 35 the lengths of springs 39 are increased as they extend both above and below the supporting edges of the upper beams. *This gives a good elastic support.* The links 32 have a swinging motion on their supporting pivot pins. *There is also a further swing of the pivots themselves, owing to the elastic support at the upper ends.* The latter motion, which may result from LONGITUDINAL movement of the bolster, compresses spring 39 more on one side of the springs than on the other, which tends to return the bolster to central position."

It is clear that this compression of the springs 39, *more on one side than on the other*, enables the supporting links to "universally swing" within limits.

Again the specification says (p. 2, l. 71):

"The transoms (40) add stiffness to the truck frame laterally: \* \* \* *They also serve as a guide for the bolster 24 to prevent its movement to any considerable extent in a direction longitudinal with the car body, and they further serve to transfer the draft of the propelling motors from the truck to the car body.*"

"By providing for the swinging of the bolster longitudinally with relation to the truck, the latter is permitted to start in advance of the car body and to thus impart its movement to the car body without abruptness owing to the action of springs 29, which being capable of varying their span and be-

ing supported by links yieldingly suspended, will neutralize in a measure sudden shocks imparted to the truck." (P. 2, 1, 85.)

Referring to Figs. 4, 5 and 6 of the Uebelacker-Peckham patent, it will be noted that the ends of the links are supported upon transversely disposed pins 56 (see Fig. 5) "around which links 54, and with them lower links 53 and yokes 52, are adapted to swing (bodily about pivots 56), thus providing for changes in the spans of the (half-elliptic) springs 29 produced by varying loads and for the swinging of said springs and the car-body-supporting bolster resting thereon LONGITUDINALLY AS WELL AS Laterally with relation to the truck frames." (P. 2, l. 125.)

It is apparent that Uebelacker desired *intentionally* to provide not only *transverse* swing of the links, semi-elliptic springs and bolster, but a *considerable and well-defined longitudinal and diagonal* swing as well. In the case of the structure shown in his Figs. 1 to 3, the *longitudinal and diagonal* swing is provided for by a compression of one side of the spiral springs 39 or a tilting action of the spring caps 37 thereon, while in Fig. 5 these parts swing *bodily* from a well-defined pivot 56. Clearly Uebelacker intended both forms of suspension, so far as the longitudinal swing is concerned—to be the equivalent for each other.

The above consideration, based upon the patent under which appellee justifies, must, we submit, be conclusive on the question of identity of construction of appellants' and appellee's trucks, their mode of operation and the results intended to be had.

We submit therefore that:

1. The Interference proceedings, and the position taken by the Peckham Co. therein, are persuasive (almost to the point of estoppel) that the prior art here set up does not affect the validity of the patents in suit.

2. A comparison of the Uebelacker patent with the patents in suit conclusively settles all questions of infringement in favor of the appellants.

The effect of the Uebelacker-Peckham application and the Brill-Uebelacker interference upon patentable novelty has scarcely been noticed by appellee's counsel. It was argued in the Court below that the proceedings in the Patent Office did not have the effect of *res judicata*. We have never suggested that they did. We do urge that they created something in the nature of an estoppel *in pais*—the law permits no man to take one position to-day and another to-morrow. And all the more so when such position is taken in solemn proceedings. The Patent Office may not be a court, but it is a tribunal created by law for the adjudication of very important questions and solemn acts done before it must have a recognized weight.

No other argument of appellee's counsel on this subject appears to require an answer. The continuity of the two Peckham companies has always been accepted as a fact. (See p. 233 of the Record).

It may be convenient to cite a few decisions of this court and some others on the subject of *patentable invention*.

### **CASES ON PATENTABLE INVENTION.**

*Keystone Manfg. Co. v. Adams*, 151 U. S. 139.

“Where the patented invention consists of an improvement of machines previously existing, it is not always easy to point out what it is that distinguishes a new and successful machine from an old and ineffectual one. But when in a class of machines so widely used as those in question, it is made to appear that at last, after repeated and

futile attempts, a machine has been contrived which accomplishes the result desired, and when the *Patent Office has granted a patent to the successful inventor, the courts should not be ready to adopt a narrow or astute construction, fatal to the grant.*"

Many later decisions of the Supreme Court hold that the question of invention must be determined not by the alleged obviousness of an invention, *after the event*, but by examining the history of the invention and the antecedent attempts of preceding inventors. The *historical* method has now superseded the *conjectural* method, and the courts thoroughly recognize that cases are not to be decided by arguments of an appellee's expert that the invention is now "*obvious*" to him, and "might have been made by any skilled mechanic," etc., but by ascertaining whether the invention would not have been made by other mechanics before the patentee if it really had *then* been "*obvious*."

*Potts v. Creager*, 155 U. S. 597, 608:

"And this is not the less true *if, after the thing has been done*, it appears to the *ordinary mind so simple* as to excite wonder that it was not thought of before. The apparent simplicity of a new device often leads an *inexperienced person* to think that it would have occurred to anyone familiar with the subject; but the decisive answer is that *with dozens and perhaps hundreds of others laboring in the same field, it had never occurred to anyone before*. The practiced eye of an ordinary mechanic may be safely trusted to see what ought to be apparent to everyone."

That the apparent simplicity or *obviousness* of an invention is no ground for invalidating a patent on the ground of an absence of invention. (See *Topliff v. Topliff*, 145 U. S. 156, 163.)

In *Consolidated Safety-Valve Company v. Crosby Steam Gauge and Valve Company*, 113 U. S. 157, Blatchford, J., said:

“ \* \* \* *Taught by Richardson*, and by the use of his apparatus, it is *not difficult for skilled mechanics* to take the prior structures and so arrange and use them as to produce more or less of the beneficial results first made known by Richardson; but, prior to 1866, though these old patents and their descriptions were accessible, no valve was made producing any such results.”

Shipman, C. J., in *Brill v. Third Ave. R. C.*, 103 Fed. 289, a truck case, held.

“The testimony of the defendant's expert himself, as he goes through the history of the art, and thereby points out what the patentee's combination *did*, as compared with previous efforts to do something, shows that the *patented improvement was patentable*.”

In *Gindorff v. Deering*, 81 Fed. 952, 953, Judge Grosscup used the following words:

“If this chuck were obvious to mere mechanical skill, why had not such skill, already called upon, supplied the need before? I fear that, under these circumstances, *were I to hold it mere mechanical adaptation, I would be considering myself a wiser and better mechanic* than those who for years had overlooked this method of accomplishing a desired result.”

In *George Frost Co. v. Cohn*, 112 Fed. 1009, Coxe, J., in sustaining the patent, said:

“It is this *capacity for accomplishing results, this faculty of seeing what others fail to see* and hearing what others fail to hear which has always distinguished success from failure and the *inventor from the mechanic*. ‘In the law of patents it is the last step that wins,’ says the Supreme Court. This is the step which Gorton took.”



The nature of the exercise of the inventive faculty in the truck patents in suit lies along the lines stated by Judge Blatchford in *Wooster v. Blake*, 8 Fed. 429:

"The invention consists primarily in *finding out what mechanical operation is necessary to produce the practical result arrived at, and when such operation is hit upon*, the mechanical work is easy. It is easy, when the mechanical operation is seen, to say that it was *obvious* that certain mechanical arrangements would effect it; but mechanical arrangements are tried and tried in vain to reach a practical result, because the mechanical operation which is to effect such result is not yet seen."

### SALES. TAKING THE MARKET.

The importance of the success of the Brill Truck shown by its extensive sales both by the Brill Company and the Peckham Company, far in excess of other types of trucks, should not be overlooked. The doctrine of "*taking the market*" is so well understood that we will only cite one or two decisions of this court.

Evidence of this sort is particularly persuasive in the present case. Ten years ago there were but few car truck builders in the United States, not more than four or five.

They build trucks only upon specific orders from the railway companies. Their customers are comparatively few. Each customer, when about to equip a street railway, necessarily makes a careful and thorough investigation of the merits of the different trucks in the market. He is an intelligent and usually a trained man, he is spending large sums and is making a choice which will affect his company, for profit or loss, for a long time to come. In fact, his trucks are the most vital part of his equipment. His requirements are severe; his judgment is cautiously and de-



liberately exercised. To take *that* market is to gain the verdict of a jury of experts. And when all the world buys largely *to the exclusion of all else*, and his chief competitor sells, practically, nothing else in this class the force of this argument becomes exceedingly strong.

*Smith v. Goodyear Dental Vul. Co.*, 93 U. S. 495, per Strong, J.:

"Undoubtedly, the *results or consequences* of a process or manufacture may in some cases be regarded as of importance when the inquiry is, whether the process or manufacture exhibits invention, thought and ingenuity. Webster, of the subject matter of patents, page 30, says: 'The utility of the change, as ascertained by its consequences, is the *real practical test* of the sufficiency of an invention. \* \* \* Where the utility is proved to exist in any degree, a *sufficiency of invention* to support the patent must be presumed.' We do not say the single fact that a device has gone into general use, and has displaced other devices which had previously been employed for analogous uses, establishes in all cases that the latter device involves a patentable invention. *It may, however, always be considered*; and, when the other facts in the case leave the question in doubt, *it is sufficient to turn the scale.*"

*Washburn & Moen Co. v. Grinnell Co.*, 24 Fed. 23, per Brewer, J.:

"Great utility \* \* \* is fair matter for consideration in determining \* \* \* the fact of patentability."

*Keystone Co. v. Adams*, 151 U. S. 139:

"While it is true that the mere fact that a device has gone into general use, and has displaced other devices which had previously been employed for analogous uses, does not establish, in all cases, that the latter device involves inven-

tion within the meaning of the patent laws, yet such fact is always of importance, and entitled to weight when the question is whether the machine exhibits patentable invention. (*Smith v. Good-year*, 93 U. S. 486, 495.)”

In view of the extensive use of the invention covered by the patent in suit, in *Topliff v. Topliff*, 145 U. S. 156, Brown, J., said:

“While the question of patentable novelty in this device is by no means free from doubt, we are inclined in view of the *extensive use* to which the springs have been put by *manufacturers* of wagons to resolve that doubt in favor of the patentees and sustain the patent.”

It was in evidence in *The Barbed Wire Patent*, 143 U. S. 275, that the patented fence did not differ radically from other fences that were old, but it was apparent also that the improvement covered by the patent in suit made the barbed wire fence *a practical and commercial success*. It was also shown that the *sales were very large*, and that the device immediately met with favor. Mr. Justice Brown said:

“Under such circumstances courts have not been reluctant to sustain a patent to a man who has taken the final step which has turned a failure into success.”

We shall now show:

1. That this record differs in many essential respects from the record which was before the Court of Appeals for the Third Circuit.
2. That the opinion in that case contained findings of fact which we deem to be erroneous, and seemed to show a misapprehension of the mechanics of the case, and, if we may say so, error in the application of the law.

**THE DIFFERENCES BETWEEN THIS RECORD  
AND THAT IN THE COURT OF APPEALS FOR  
THE THIRD CIRCUIT.**

*(a) The Appellants' additional evidence here.*

The present record contains undisputed evidence not before that Court, that the truck here in suit marked an "epoch" in the electric truck art, and was the "highest development" therein; that it is the standard truck for high-speed traffic. This evidence, under the authorities, is of importance and in many cases has been considered as of controlling weight.

Again, in this case Mr. Uebelacker, the patentee of the patent under which the appellee justifies, testifies that, *by order of the Peckham Company, he inspected some of the earliest Brill trucks here in suit, made drawings of them and designed trucks of the same construction; and that that company procured him to file an application* (assigned to it before issue) for letters patent claiming the *broad features* of construction of the Brill trucks he had thus inspected—facts which convict the Peckham Company of very deliberate piracy. This evidence was not in the North Jersey case.

*(b) The Appellee's case here also differs essentially.*

In this case the same prior art patents are set up as in the other case, with some additional patents, but the rest of the evidence is *essentially different*. A *different expert witness* testifies here and presents quite a different point of view of the various prior art patents.

A most vital difference arising out of this change of expert witnesses is in respect of the Thyng truck, which, in the North Jersey case, was the structure most seriously urged by counsel and by the expert in that

case. The expert evidence in that case rested entirely upon the Thyng truck with the suggested *substitution* therein of the Haskins or Brill & Curwen spring links, which, they testified, required nothing more than mechanical skill. The opinion of the Court of Appeals for the Third Circuit was based upon and followed that theory (but did not mention Haskins). But neither of the expert witnesses in that case have testified here.

In the North Jersey case the expert witness, Fowler, testified at great length on the mechanical differences between the complainants' and defendant's trucks to show non-infringement. No such evidence is presented here. Infringement is not here denied, if the claims in suit are to be construed as they read. Mr. Freeman's evidence, at p. 204 of Rec. middle of page, is clear authority for this statement. In the North Jersey case infringement was contested. The erroneous differentiations of the expert in the North Jersey case (Mr. Abbott) were much relied upon by the Court and led it to what we believe to be erroneous conclusions. *Mr. Abbott was not called as a witness in this case.*

Other differences will be developed in the following pages.

### THE OPINION OF THE COURT OF APPEALS.

We submit, with great deference, that the opinion of the Court of Appeals for the Third Circuit contains certain erroneous findings of fact and is based upon a misapprehension of the mechanical issues involved in the cause.

#### (a) *It Misunderstood the Thyng Truck.*

The opinion makes the *fundamental error* of finding that the semi-elliptic springs of the Thyng truck

"are suspended from the side frames by *universally moving links*." To this we say:

1. That the contrary clearly appears in the Thyng drawing and specification.

2. That the opinion based this erroneous finding upon the evidence of Phillips Abbott, defendant's expert witness there, *who is not a witness in this case*.

3. That the quotation in the opinion of the Court of Appeals from complainants' expert, Mr. Livermore, upon which it partially based that finding, was an erroneous interpretation of his language as there quoted, and,

4. That the words quoted from his evidence in the opinion of the Court in that case are not found in this Record.

We will take up these points:

The opinion states (referring to the Thyng truck):

"The semi-elliptic springs are suspended from the side frames by *universally moving links*."

But an inspection of the Thyng patent shows that the Thyng links have only *transverse* motion. This appears clearly in Fig. 3 of the Thyng drawings and in several passages of the Thyng specification. Thus:

"The nature of my invention consists in supporting the car body on a flexible or equalizing bolster, and suspending and governing the *lateral* motion of the same by shackles."

"This allows the *bolster* to move *endwise* and the car body to move *laterally* independent of the truck."

"The *bolster* is allowed to move *endwise* freely between two girts in the truck frame; this motion which gives the car body its *lateral* motion, etc."

"What I claim \* \* \* is the mode herein described of hanging the car body and governing its lateral motion, etc."

This erroneous statement is a *fundamental* part of the description of the Thyng truck in that opinion; it then states:

"The foregoing description which we extract from the *testimony* of Mr. Abbott, the defendant's expert \* \* \*,"

But Mr. Abbott did not testify in this case and there is no evidence here such as he gave there.

Motion of the links in the direction of the length of the car cannot, as intimated in the opinion of that Court, be secured by reason of the space between the bolster and the transom. This space is shown in the drawing, Fig. 1, of the Thyng patent to be probably less than a quarter of an inch. It is simply enough to allow the easy vertical play of the bolster between the transoms.

The opinion then quotes the language of *complainant's* expert as confirmatory of its finding that "the Thyng patent discloses every feature of the principal combination of the patents in suit, with the single exception that the links are not extensible or, in other words, do not embody a spring."

The language quoted from Mr. Livermore in the opinion is as follows:

"The first is the Thyng patent, No. 275, dated November 18, 1845. My comparison of the structure shown in this patent with the Brill truck has before been fully given. It does not disclose a car truck embodying the combination of a truck frame having side frames, a bolster, longitudinally arranged semi-elliptic springs supporting the ends of the bolster, the elastic links or elastic or extensible suspensions of any kind connecting the ends

of the semi-elliptic springs with the side frames. *It does, however, embody a combination including all of the above-named elements except the elastic and extensible links, and it has non-elastic links jointed for transverse swinging to connect the ends of the semi-elliptic springs with the side frames."*

This clearly *does not sustain* the above finding of the Court of Appeals. The meaning of this last sentence (the part italicized) is obviously that the Thyng truck differs from the Brill truck in suit in *two* respects, that is, in *not having* "elastic and extensible links" and in *having* links which have capacity for "transverse swinging" only.

Mr. Livermore's sentence is badly constructed, but his meaning is clear. He states *two* points of difference between the Thyng and Brill structures, and not *one*, as erroneously inferred in the opinion of the Court of Appeals.

Here, then, was a *fundamental* finding—the most important, mechanically speaking, in the case—based upon Mr. Abbott, who is not a witness here, and upon a misconception of Mr. Livermore's evidence, *which evidence is not in this case.*

The opinion, then, of the Court of Appeals, starting with a fundamental misapprehension of the Thyng truck, assumed that as a basis, and looked to other prior art patents for a spring link to substitute therein. It proceeded to find suitable spring links in the Longstreth and the Heffernan locomotive patents, in the Graham patent, in Brill & Curwen, and in the Peckham patents No. 464,253 and No. 563,685 (the latter of which was issued after the invention of the truck in suit), and held that Mr. Brill merely substituted in the Thyng truck an old form of spring link, and that this substitution did not involve invention.

But our answer to this is, we submit, complete.

Who has shown how this substitution can be made? Let anyone who will, take these six patents, one by one, and see if he can substitute any of their "spring" links in the Thyng truck. No one has ever done it. No one has pointed out how it can be done. *Suggestions* are not enough. The result must be a practicable *truck*, and it must be *mechanically correct* as it is to carry enormous weights on irregular tracks and on sharp curves at forty miles an hour.

Is it not a complete answer to all this to say that any one who could make this substitution is within the protection of the patent law? Even if that is all Mr. Brill did, is it not enough? Even if that is all he did, has he not produced a truck that has marked an "epoch" in this art and almost superseded all other trucks?

What was there in 1895 to show anyone that this substitution was *desirable*? As Judge Blatchford said in *Wooster v. Blake*, 8 Fed. 429:

"The invention consists primarily in *finding out what mechanical operation is necessary* to produce the practical result arrived at, and when such operation is hit upon *the mechanical work is easy*."

Furthermore, the argument of "*obviousness*" is contrary to the rule laid down in *Topliff v. Topliff*, 145 U. S. 156, and the other cases cited above.

Judge Bradford well understood these patents. The same argument of "substitution" was urged for two days before him—on the same patents to Thyng, Haskins and Brill & Curwen. His reply was:

"The prior art is also relied on by the defendant to negative patentability in the invention described and claimed, and many patents and other exhibits have been produced in evidence in support of its contention. There can be no doubt that in a broad sense all the elements entering into the combination of claim 13 were old and well



known. At the time the invention embodied in that claim was conceived there was, generally speaking, nothing patentable in such spring links, semi-elliptic springs, or other elements, separately considered, as entered into the combination claimed. But the several elements, though old, *were so adjusted and combined in the mechanism covered by the claim as to co-operate in producing a joint result which could not be obtained from a mere aggregation or assemblage of the different elements.* By way of illustration, the spiral springs in the supporting links and the semi-elliptic springs *are so associated that the action of the former is modified by that of the latter, and, conversely, the action of the latter by that of the former.*"

Mr. Livermore expresses the same thought. He testifies (Rec., p. 504):

"The foregoing elements make *unitary* structure or structural *combination*, every feature of construction and arrangement of which is essential for the proper coaction of all the parts to attain the results that the truck is intended to produce.

"By this construction and arrangement the springs of the system, and especially the semi-elliptic springs, combined with the spiral springs of the spring links by which the semi-elliptics are suspended from the side frame, not only contribute to the easy riding of the car body by absorbing the shocks that would otherwise be transmitted from the wheels of the car body, but they serve very efficiently to relieve the truck structure of internal strains that are incident to various of the constructions of the prior art, and *by their conjoint action accomplish more than the sum of their individual actions or effects, which might be obtained if the same elements were incorporated in other arrangements in a truck structure.*"

But, as we have pointed out, four of the very patents in which the Court of Appeals found spring links

that could be substituted in the Thyng truck, have never been seriously urged by appellee's counsel and were not even set up in the New York case before Judge Lacombe, though they had been in the North Jersey record (*but were not seriously urged at the hearing of that case*).

These were Longstreth, Heffernan, Graham and the Peckham 1891 patent.

*The doctrine of substitution in the patent law and its inapplicability here.*

The doctrine of *substitution* in the patent law means that it does not constitute patentable invention merely to substitute one old and well-known material for another, or one old mechanical and equivalent element for another, where no new function of the elements relative to each other is present, or where no new result is achieved by the substitution. Wherever "substitution" is set up, it must be shown that the machine in which the element is substituted, *required no particular change or alteration* to fit the substituted element to its new environment. Where an old element is incorporated into an old machine or device and there combined in a new way so as to produce a new combination of elements, and there perform functions and produce results which the element in its old environment did not do, the defense of "substitution" does not apply.

The lack of applicability of the substitution doctrine to the case at bar may be illustrated as follows:

If one should take the non-resilient and non-universally swinging shackles from the Thyng truck and substitute therefor another form of shackles, differently arranged, but which have no spring or universally swinging features, the latter form being well known in the art, the mere substitution of this latter old and

well-known and equivalent form of shackle for the shackle in the Thyng truck may not involve the exercise of the inventive faculty, for the reason that no new function or mode of operation or result would thereby be incorporated into the structure of the Thyng truck. Likewise, the substitution of a glass or porcelain knob on a door in place of one made of wood or metal has been held to constitute unpatentable substitution. Likewise, the substitution of one old form of printing roller for another old form of printing roller in a printing machine has been held to constitute unpatentable substitution.

But the semi-elliptic spring suspension of the Brill truck differs from that of the Thyng patent in the essential aspects of a universal swing and spring support; the incorporation of a *freely swinging spring* link into the Thyng truck in place of the non-resilient and substantially inflexible (except in one direction) shackles of the Thyng patent is not the substitution of one *equivalent* element for another. The substituted element would be *new* to the old organization, would have new functions in its new environment and would produce new results *not contemplated* in the Thyng truck. While it might be stated that new combinations of elements sometimes involve the bringing together of old elements into a new environment, the test of the difference between what is known in the patent law as a patentable and novel combination of elements and the opposite doctrine of unpatentable substitution, resides in the novelty of combination and function and result. Where these three elements are present, the doctrine of substitution cannot be considered as applicable.

The chief trouble with the appellee is that nowhere in the prior art patents do they show a *universally hung* spring link which is capable of removal from its old environment and of being incorporated into the Thyng truck *without modification or reorganization*.

- (b) The Court of Appeals erroneously found that the Electric Railway Truck Art was in a highly advanced state in 1895.

Its opinion states as follows:

"Under the proofs it is very clear that the art of truck construction, whether relating to car trucks generally or to trucks employed in passenger service in *connection with electric propulsion*, was old and in a *highly advanced state* at the time Brill made these patented improvements."

But the facts here proven are, we submit, *directly contrary to that*. The history of the art is so well known, has so grown up in the very streets of the cities where we live, that it is almost a matter of judicial cognizance. Every one remembers when electric cars began and when the long, double truck cars first appeared. Electric street railway propulsion came in about 1888, and had been but slightly developed by 1891. About 1892 or 1893 came the demand for *double-track* cars mounted on *pivotal* trucks. This record shows that the *first and only pivotal truck* that was then introduced to meet this demand and was largely used was the *Maximum Traction* truck. After its introduction, as the business grew, came the demand for *higher speed* and the use of *two motors* on *each truck*, which was impossible with the *Maximum Traction* trucks. In 1895, *when the art was still young*, Mr. Brill invented the truck in suit. That record showed, and this record shows (*both without dispute*), that these two trucks, the *Maximum Traction* truck and the truck of the patents in suit, are, practically, the *ONLY pivotal* trucks that came into general use for electric street railway purposes. Furthermore, the evidence shows in this case that the *steam railway truck art* taught nothing to the electric street railway art. The conditions were entirely different—arising out of the necessity for pro-

viding space for the motors and of using low-hung cars, with trucks capable of rounding sharp curves. None of these conditions existed in the steam railway art. (See *supra*, p. .)

All of these facts are entirely undisputed. (See *Akarman*, p. 420, Q. 5-16.)

- (c) *The opinion found erroneously that the date of conception of the Brill invention was not carried back of Brill and Curwen patent.*

The learned Court, referring to this patent, said:

"The filing and issue dates of the Brill and Curwen patent show *prima facie* their priority over Brill, and we find no special evidence to rebut that final showing."

The Court in this quite overlooked the *undisputed proofs*. The conception of the invention here in suit was there shown to have been in December, 1895; the Brill and Curwen application was not filed till November 3, 1896. That patent was dated August 30, 1898.

- (d) *The Peckham patent of 1896, considered in the opinion as part of the prior art, was erroneously so considered.*

The Peckham patent of July 7, 1896, No. 563,685, was *too late*; these Brill trucks were built and put in use in California as early as *March*, 1896.

- (e) *The Court gave an erroneous effect to the language of the parent patent in suit in which reference is made to a pending application of Brill (the present patentee) and Curwen.*

The opinion states:

"But the admission of the disclaimer settles the question of priority in favor of Brill and Curwen. Patent No. 610,118 to Brill and Curwen must be taken as a part of the prior art."

This, we submit is erroneous, as we have pointed out, *supra*, p. —

The "admission of the disclaimer" has nothing to do with the question of *priority of invention* as between the application for the patent in suit and the Brill and Curwen application. An inventor having two inventions in the same art may seek patents on both at the same time, and that he does so has no bearing in the matter of priority of invention as between the subject matter of his two applications. He may (usually he *must*) divide his inventions between his two applications and define the scope of each by referring to the other, without making the other a part of the prior art. By doing so he merely *limits and defines the scope* of what he claims; he does not, by such reference, *create a prior art*.

This disclaimer, we think, has just the value to it by its own words, which were correctly interpreted by Judge Bradford, and no more.

**(f) . The Court misapprehended the construction of the Brill & Curwen truck.**

The opinion of the Court of Appeals quotes two claims from the Brill & Curwen patent and finds that the only difference between the combination therein claimed and the "principal combination of the claims involved in this suit is that the latter claims call for semi-elliptic springs for connecting the links instead of equalizing bars." The Court failed to observe that the Brill & Curwen truck is an entirely different class of truck from the truck in suit. It is known as a "*swing bolster*" truck. Brill & Curwen has full elliptic springs *inside* of the wheel base, and located between a spring plank (an additional member of its structure not present in the truck in suit) and the bolster. They are transversely disposed. The truck of the patents in suit

has half-elliptic springs *outside* the wheel gauge, longitudinally disposed. To remove the rigid equalizing bar of the Brill & Curwen patent and substitute a half-elliptic spring would not give the truck of the patents in suit.

**(g) That opinion misapprehended the construction and mode of operation of Appellee's spring links.**

The opinion states as follows:

"In consequence of this construction, the complainant's link has an unrestrained universal swing or movement, and also a *telescopic or lengthening or shortening* action by reason of its several parts sliding with relation to each other. The *defendant's* link is not so constructed *nor has it such universal swing* or such *sliding* movement.

Both of these statements are erroneous.

In the defendant's truck the load compresses the spiral springs and thereby extends or *lengthens* the links (*mechanically* speaking) precisely as is the case with the complainants' links.

1. It is the *second* patent in suit which the specific form of defendant's links infringes, not the *first*. The latter *might be* considered "telescopic." The links of the second patent are clearly *not* sliding or telescopic. They work precisely as the defendant's links, from a *mechanical* point of view. The difference between them is solely in the point of location of the spiral springs. Claim 13 of the parent patent is generic as to the forms of links; the *specific form* of link is covered in that case by the claims of the *second* or divisional patent.

2. An inspection of the appellee's truck show a "universal swing," beyond question. See the Uebelaker patent and the model of it in evidence. Arkarman so testifies (Rec. p. 430 XQ. 66-69).



3. Again, in this connection, that opinion proceeds to say that the "longitudinal movement [of the defendant's link] is *resisted*, etc."

This, we submit, is mechanically erroneous. This longitudinal swing is, it is true, *cushioned* against shocks, but *full* capacity for all *necessary* longitudinal movement is present. The resistance to longitudinal swing which is presented by the spiral springs of the defendant is precisely the same resistance as is found in the corresponding spiral springs of both *patents in suit*, more especially in the second Brill patent. (See Fig. 1 of No. 627,898, and Fig. 1 of 627,900.) It is part of the *method of operation* of both trucks. That the defendant fully *provides* for complete capacity for longitudinal swing (indeed universal swing) appears in Fig. 5 of the *Uebelacker* patent under which the *defendant justifies* (No. 635,986), and is elaborately set forth in the specification of that patent. (See p. 2, l. 85.)

(h) : The opinion is not correct in its comparison of the spring links of the patents in suit with those of appellee's truck.

The opinion quite overlooks the *second* patent in suit. It states:

"The link of the complainant's patent embodies the following features. \* \* \*

(2) A spiral spring enclosing the rod *below the side bar*, and

"(3.) A *stirrup or hanger*, the lower end of which is below the rod and there engages with the end of the semi-elliptic spring, the upper end of the stirrup passing inwardly so as to rest upon a cap which is placed above the spring."

These features are really *not found* in the *second or divisional* patent in suit. It is *this* patent which covers the *specific form* of spring link and of which the



complainants there alleged infringement (as do the appellants do here).

The comparison made in the opinion between the complainants' and defendant's links is quite wrong in stating that the complainants' link of the divisional patent has "a telescopic or lengthening or shortening action." There is absolutely no difference between the defendant's links and the links of the *second* patent, *as links*. The only difference is in the location of the spiral springs in the links which is not a mechanical difference. Both are extensible in the same way. Both have the capacity for universal swinging movement, as has been pointed out above.

Again, at the close of the opinion it is said: "We hold, therefore, that the defendant's links do not infringe the *claim* in question."

It would seem that the claim in the mind of the Court was claim 13 of the *parent* patent, that being the last claim previously referred to in the opinion. The comparison should have been between the defendant's links and the claims of the *second or divisional patent*.

- (i) **That opinion was mistaken in its statement that Brill's only advance over Thyng lay in the extensible or elastic links.**

That Court held a clearly mistaken view in the following statement:

"It appears then that the only advance made by Brill on Thyng was to substitute for the latter's non-elastic links for supporting the semi-elliptic springs extensible or elastic links."

On the contrary, the gist of the invention and the advance over any earlier device and the very thing that has *made* this truck a *success*, lay in the support of the half-elliptic springs by a *resilient* "suspension" having movement both *longitudinally, transversely and diagonally*.

- (j) The opinion misapprehended the Heffernan patent; also the Longstreth, Graham, and Brill & Curwen patents.

The opinion makes the following statement:

"The Heffernan patent No. 412,256, dated October 8, 1889, shows the combination of a truck-frame, spring-links depending from the truck-frame, semi-elliptic springs connecting the links, and means for connecting the latter springs with the car body."

Now, if by this it be intended to state that Heffernan shows the elements of claim 13, we submit that this is an error. Claim 13 includes links which have *longitudinal, transverse and diagonal* (that is, *universal*) movement. But this is not disclosed by Heffernan, and Heffernan shows no 'means for connecting the semi-elliptic springs with a car body.'

In Heffernan, the half-elliptic springs have no *transverse* swing, and practically no longitudinal swing. They work only *vertically* in sustaining the locomotive boiler and frame.

The same thing is true of the Longstreth patent and also of the Graham patent, in which latter the semi-elliptic spring does not swing and the links themselves have no capacity for *transverse* motion.

In Graham the links do not sustain the half-elliptic springs. They rest on the *axle boxes*. The weight of the truck frame and car body is taken on the spiral springs in the first instance. They are merely a form of *axle box* springs.

The Brill & Curwen patent certainly does not show the *longitudinal* or *diagonal* (that is *universal*) movement of the links, which is essentially a part of the patent in suit and is covered by claim 13.

**(k) That opinion took an erroneous view of the Peckham 1891 patent.**

The Peckham patent of 1891, referred to in the opinion of the Court does not show an *extensible* spring link or even a *swing link*. The device referred to by that Court is evidently the left-hand figure of figure 3 of that patent (464,253).

1. This structure cannot be said to be *spring-supported* in any sense relevant to this issue, because the only thing approximating a spring is the rubber part marked *t*, which is a mere pad of rubber used for deadening shocks, and which is tightly clamped above by the set screws *nn* and the washers *oo*. Clearly in this respect it has no approximation to the patent in suit.

2. It is not a *swinging* link, because the above-mentioned clamps *nn* and *oo* would prevent any swing, and furthermore the space around the rod or eye bolt *j* is filled with a rubber tube *t*<sup>1</sup>. The specification speaks of *lateral* movement, but the drawing does not show it and the *entire object of a motor hanger* forbids it. There can be no lateral movement of this eye bolt, because it supports the nose of the motor, which is geared to the axle and the gearing of which must be kept in *proper alignment*. The only possible movement can be that which comes from about a quarter of an inch thrust of the axles in the axle boxes.

**(l) Appellee in this record, does not rely upon the alleged substituting patents discussed in the opinion of the Court of Appeals.**

That opinion holds that the links of the patents to Longstreth (locomotive), Heffernan (locomotive) and Graham, and to Brill & Curwen, can be substituted in the Thyng truck and thus constitute the truck in suit.

But the expert in this case, Mr. Freeman, relies upon none of these links. (See his summary in Rec., p. 195.) Apparently he agrees with us that it would be impossible to substitute the springs of those patents in the Thyng patent.

(m) **The Uebelacker-Peckham Patent and the Brill-Uebelacker Interference were overlooked by the Court of Appeals.**

It entirely overlooked the argument in favor of the validity of the patents in suit arising from the Brill-Uebelacker interference and the language of the Uebelacker-Peckham patent.

And it entirely overlooked the argument bearing upon the infringement of the second patent based upon the Uebelacker-Peckham patent under which the appellee justifies. This justification imports that the appellee's truck in controversy is made in accordance with the disclosures of that patent. The truck of that patent undoubtedly has *ample longitudinal movement*. It is *ample* whether it be restrained or not. *Restraint* simply means *cushioned*. Such restraint is a *part of the spring system* of the Uebelacker-Peckham truck. And precisely in the same way, in the truck in suit, there is a restrained movement by reason of the spiral spring. The only difference is that the restraint in the appellee's truck is under the point of support of the link; the restraint in the appellants' truck is below the side frame. Mechanically, they are the same.

**The Doctrine of Kessler v. Eldred, 206 U. S. 285.**

That case, decided after the argument in the Court below and before the opinion, was brought to the attention of the Court below by appellee's counsel with motion of appellant's counsel.

The Court below does not appear to have con-

sidered it applicable. It is merely an application of the ordinary doctrine of *res judicata* to certain facts. Like any other case of the same kind, if a party wishes to avail himself of it, he must do so in the ordinary way. Whether this be by plea, or, when there has been no opportunity to plead, by offering the record of the prior proceedings in residence, need not be considered here.

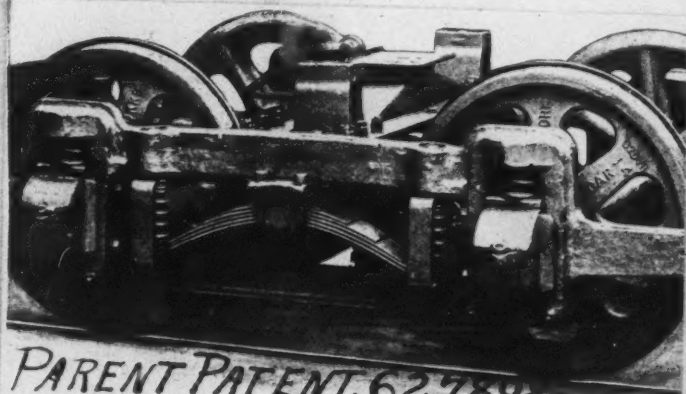
In *P. W. & B. R. Co. v. Howard*, 13 How. 307, 335 it was held:

"If a party has opportunity to plead an *estoppel* and voluntarily omits to do so, and tenders or takes issues on the facts, he thus waives his *estoppel*."

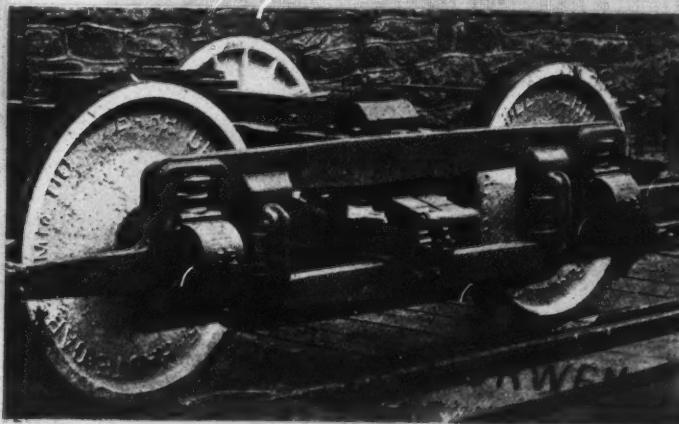
It would be impossible to enforce the *estoppel* of a judgment when the record is not before the Court.

We submit that the decree of the Court below should be reversed and the record sent down with directions to reinstate the bill and enter a decree sustaining the validity of the patents in suit and for an injunction and an account.

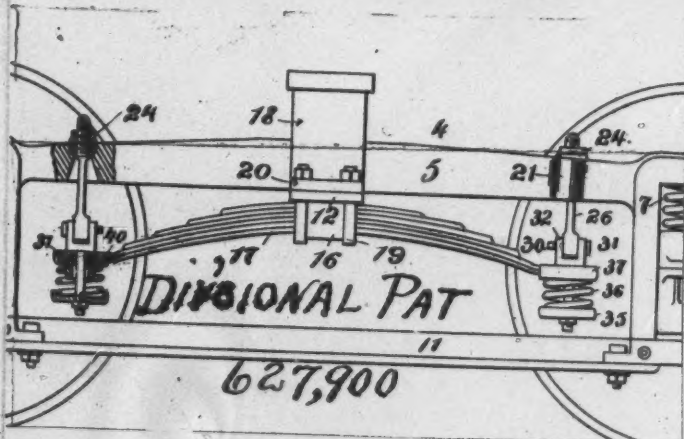
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FRANCIS RAWLE,  
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*for Appellants.*



PARENT PATENT 627,898

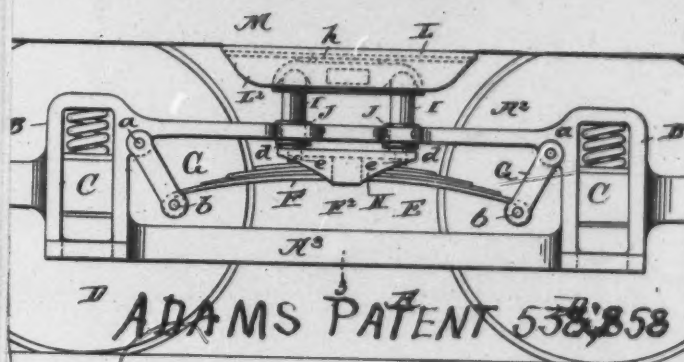


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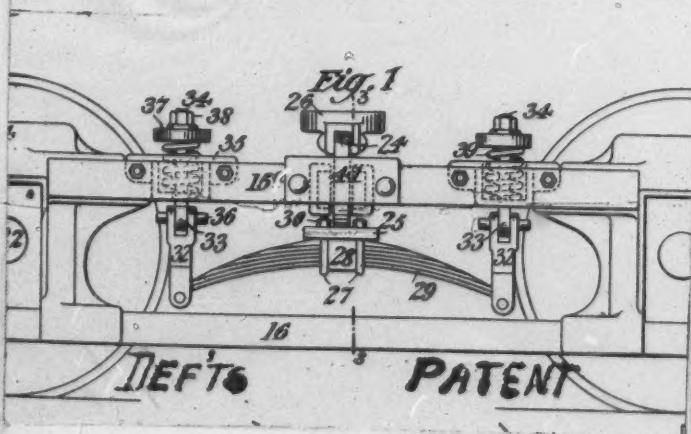


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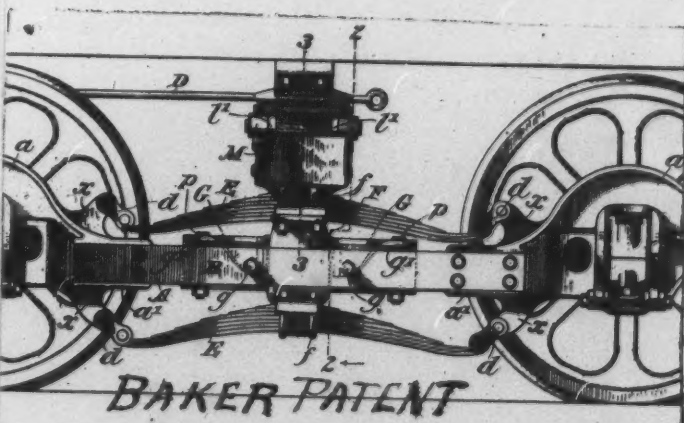


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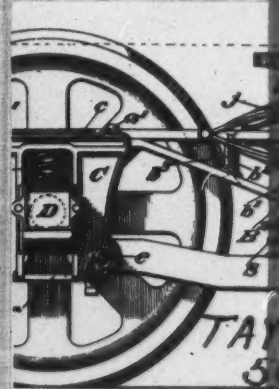


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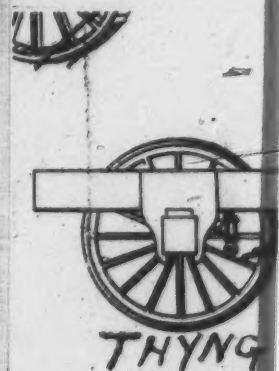
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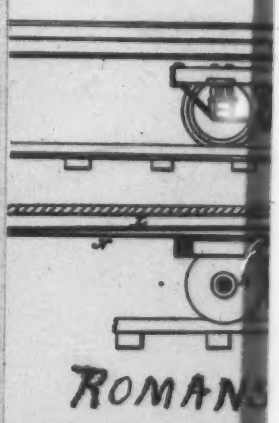
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TAYLOR

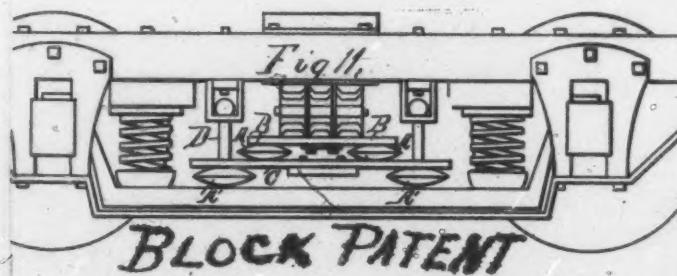
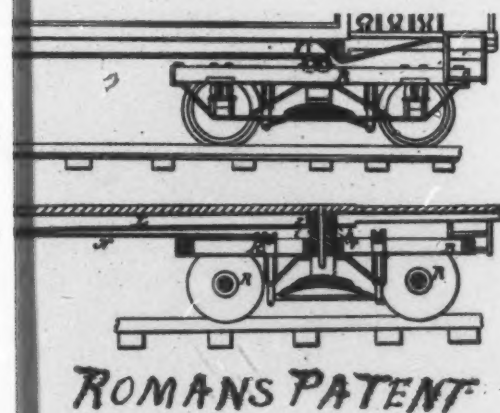
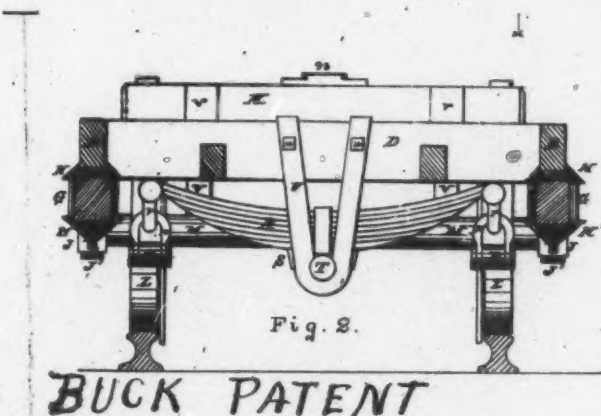
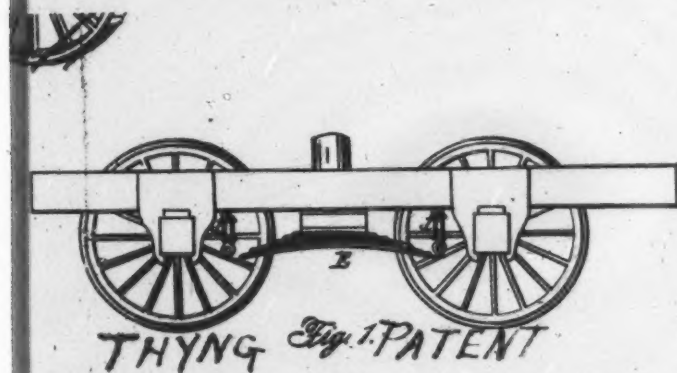
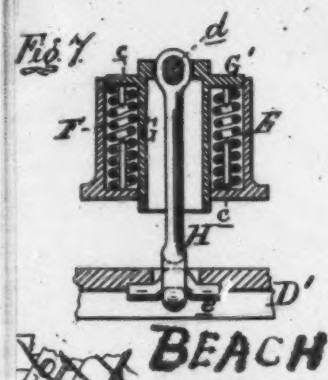
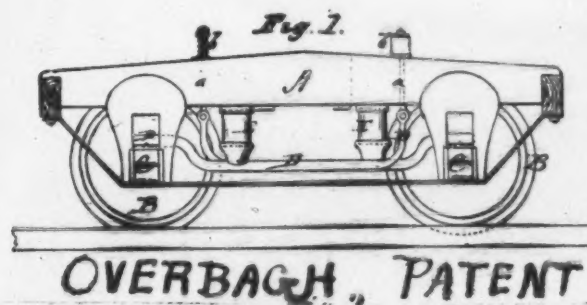
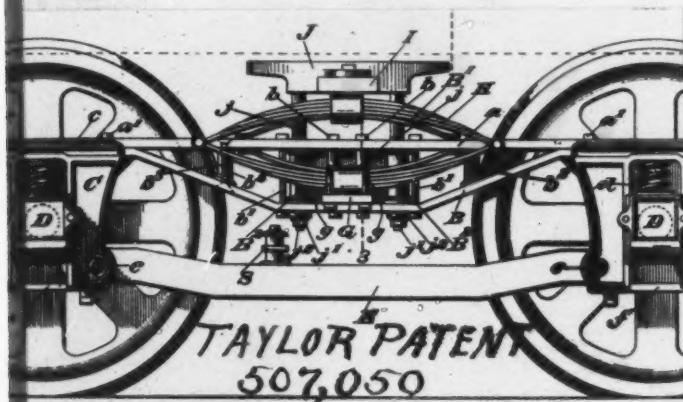


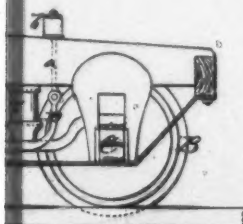
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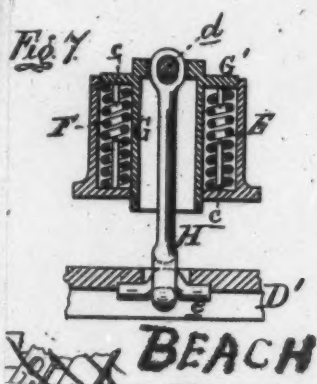
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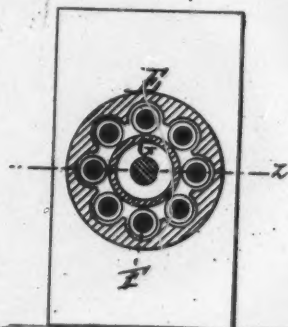


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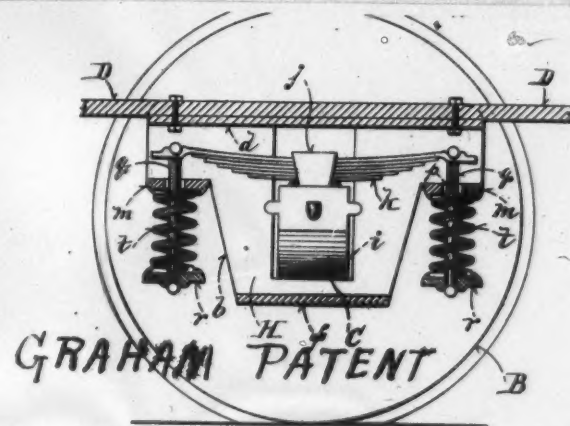


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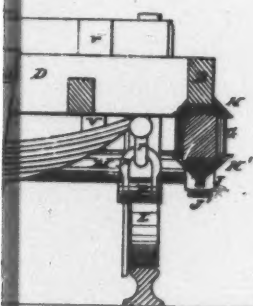
Fig. 6



F



GRAHAM PATENT



NT

Fig. 9



HASKINS PAT

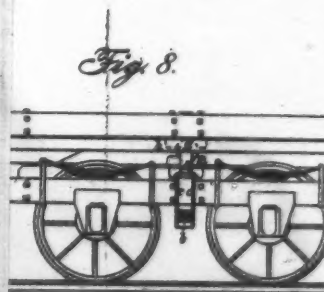


Fig. 8

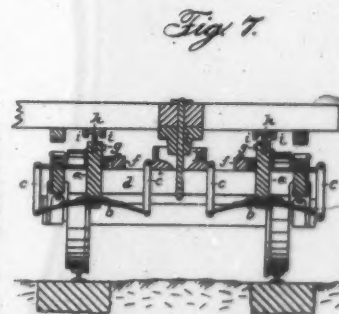
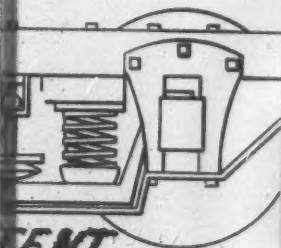


Fig. 7

DAVENPORT & BRIDGES



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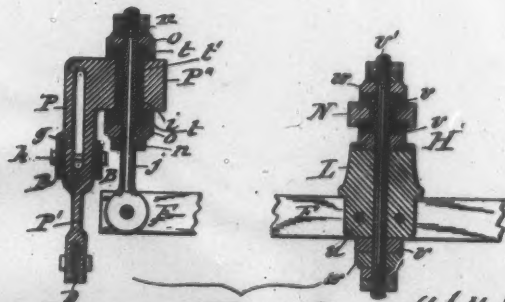
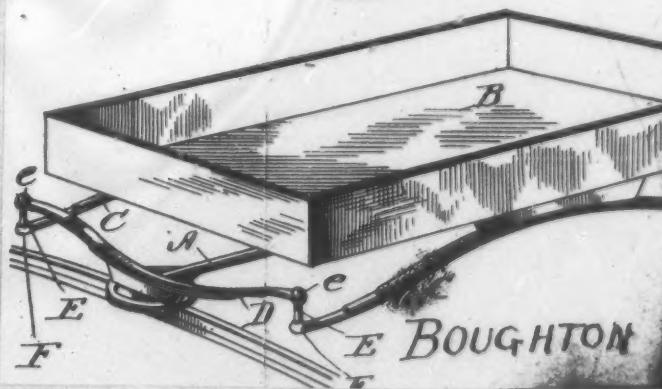


Fig. 3

464,253

PECKHAM PATENT



E BOUGHTON





U. S. Supreme Court  
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JAMES H. WALKER

# Supreme Court of the United States.

OCTOBER TERM, 1909.

No. 66.

JOHN A. BRILL AND J. G. BRILL COMPANY,

*Complainants-Appellants,*

vs.

THE WASHINGTON RAILWAY & ELECTRIC COMPANY,

*Defendant-Appellee.*

## BRIEF FOR DEFENDANT-APPELLEE.

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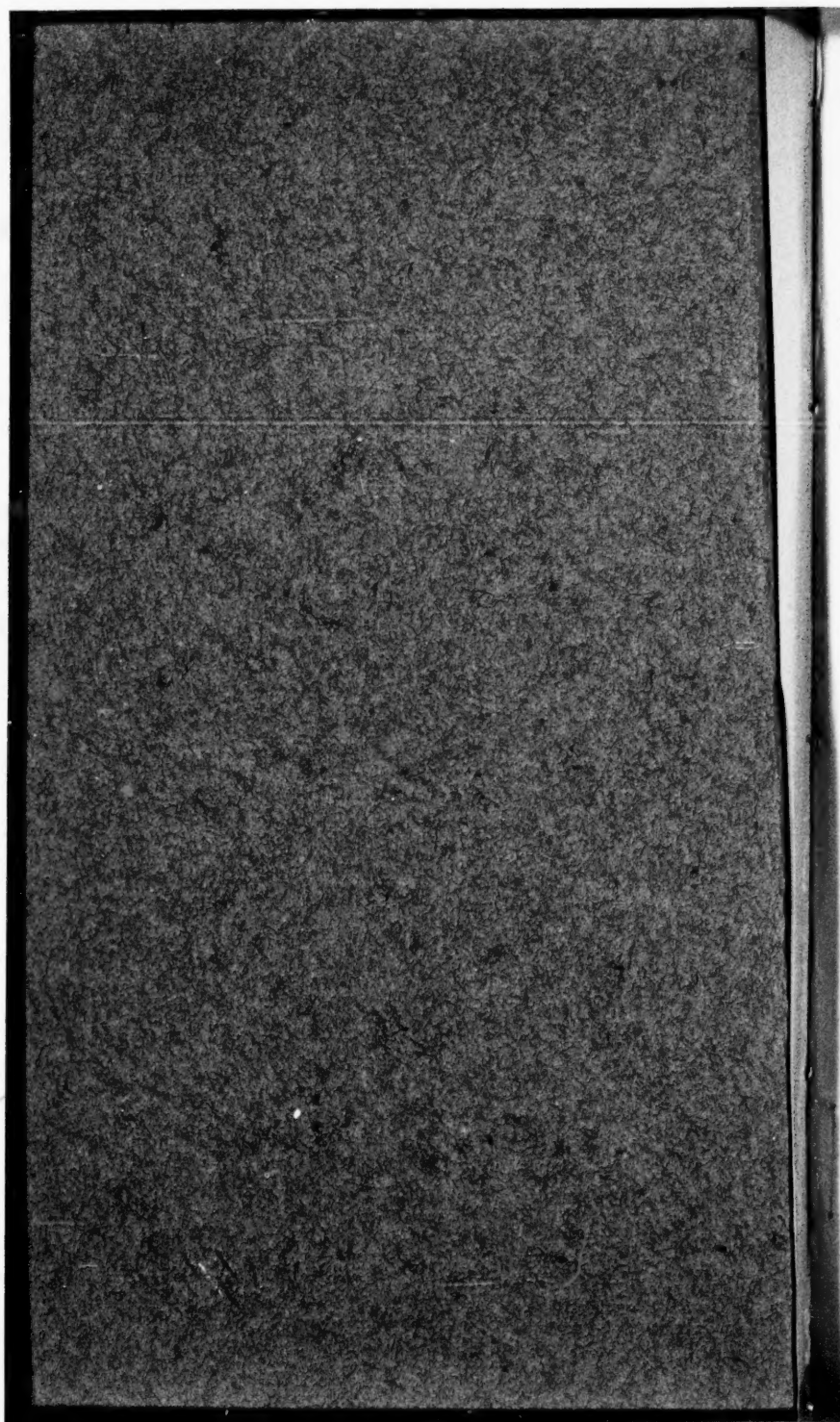
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## Supreme Court of the United States.

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JOHN A. BRILL and J. G. BRILL  
COMPANY,  
Complainants-Appellants,

VS.

THE WASHINGTON RAILWAY &  
ELECTRIC COMPANY,  
Defendant-Appellee.

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### BRIEF FOR DEFENDANT-APPELLEE.

#### Statement.

This is an appeal on the part of John A. Brill and J. G. Brill Company, complainants-appellants, from a final decree of the Court of Appeals of the District of Columbia, based upon its unanimous opinion affirming a decision of his Honor Judge Stafford in the Supreme Court of the District of Columbia, dismissing a bill in equity, with costs to the defendant. This suit is the last of a series of suits involving the same subject-matter, and is for the alleged infringement of two claims of United States Letters Patent No. 627,898 and four claims of United States Letters Patent No. 627,900, both granted to George M. Brill, June 27th, 1899, for improvements in Car Trucks, the latter patent being divisional and more specific. His Honor Judge Stafford very properly invoked the rule of comity as the foundation for his decision, but the



Court of Appeals also expressed a strong opinion upholding the contentions of defendant-appellee upon the merits.

Inasmuch as the appellants and appellee occupy the same relative positions as in the court below, they will be referred to throughout for convenience as "complainants" and "defendant." The reference to the testimony in this cause have necessarily been made to the numbers of the pages of complainants' and defendant's records (C. R. and D. R.) appearing in black figures at the top of each page of the transcript of record, without regard to repaging, inasmuch as the transcript of record in this court has not come to hand up to within three days (presumably) before the argument. The printed records of the parties, however, are to be incorporated in their entirety in said transcript, so that either method of reference is equally convenient.

### **The Claims Involved.**

The claims of Patent No. 627,898 are as follows:

"13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described.

"81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described."

The claims of Patent No. 627,900 are as follows:

"13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted

between their ends, said links being pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described.

"14. In a car-truck, the combination with a side frame, of the cross-bolster suspended below the side frame by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frame, substantially as described.

"15. In a car-truck, the combination of the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and articulate and pivoted links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

"17. The combination in a car-truck having an upper chord, of the longitudinally disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

*There are one hundred and twenty-four other claims of these patents which are not involved. Complainants have uniformly argued this case and its predecessors from the standpoint of the characteristics of physical constructions shown in the*

*patents in suit, and present it, may be, in their commercial constructions, BUT NOT PRESENT NECESSARILY OR OTHERWISE IN THE CLAIMS. The latter are merely for a subcombination.*

### History of Litigation.

The present suit is the fifth which has been begun by complainants herein, the first in order having been prosecuted by John A. Brill, assignee of George M. Brill, the patentee, without joining the J. G. Brill Company, which, as it subsequently appeared (x-Q. 13 and Ans., p. ~~92~~, C. R.), was, and is, the exclusive licensee under the patents, and joined in the subsequent suits. All of these causes have involved alleged infringing constructions of precisely the same type, the Peckham 14 B3 trucks, and all of the claims here involved were involved in the parent suit in which a final adjudication has been had (124 F. R., 778). These suits have been directed, in the order named, against North Jersey Street Railway Company, in the United States Circuit Court for the District of New Jersey (p. ~~111~~, D. R.); Peckham Motor Truck and Wheel Company *et al.* (p. ~~116~~, D. R.), and Peckham Manufacturing Company *et al.* (p. ~~114~~, D. R.), in the United States Circuit Court for the Southern District of New York; Anacostia & Potomac River Railway Company and The Washington Railway and Electric Company, in the Supreme Court for the District of Columbia (~~par. 111~~, p. ~~2~~, C. R.). The suit first named has gone to final hearing, been appealed, and a rehearing petition filed and denied (p. ~~113~~, D. R.) by the Court of Appeals for the Third Circuit. That suit was defended by Peckham Motor Truck and Wheel Company, the manufacturer and predecessor through purchase in business of the Peckham Manufacturing Company, which is defending the present suit (~~fol. 258-9~~, pp. ~~86-7~~, D. R.). As appears by the opinion, pages

813-4 328  
~~101-110~~, and the decree, pages ~~111-112~~ of ~~Defendant's~~ Record, here in evidence, complainant was defeated, "Claim 13 of the Brill Patent No. 627,898, and *all the other claims in suit which rest upon the like combination*" being declared void for want of patentable invention (bot. p. 9 of Opinion, pp. 101-110, D. R.), Claims 13 and 17 of Letters Patent No. 627,900 being further declared not infringed. Claims 14 and 15 of the latter patent, here involved, were there involved but not adjudicated (124 F. R., 778), counsel having consented to such a status at the time of the settlement of the interlocutory decree in the lower court. A petition for a rehearing was filed and denied (p. 113, D. R.).

Preliminary injunctions, which had been obtained in the Southern District of New York in the suits against the Peckham Motor Truck and Wheel Company and Peckham Manufacturing Company, based upon the decision of the lower court in the North Jersey suit, in favor of complainant, have been respectively vacated and reversed upon appeal, the Circuit Court and Circuit Court of Appeals having adhered to the rule of comity (pp. ~~116-117~~, D. R.).

The suit against Anacostia & Potomac River Railway Company has been discontinued (~~par. 111~~, p. 2, C. R.).

It accordingly appears that the present suit involves the same complainants, the J. G. Brill Company being one of a combination of several companies (Ans. x-Q. 229 and 230, p. ~~516~~), and having been in privity with John A. Brill in the North Jersey suit; that the manufacturer of the alleged infringing trucks is, and was, the real defendant in each case; that the Peckham Manufacturing Company is the successor in business, through purchase (p. ~~277~~, C. R.), of the Peckham Motor Truck and Wheel Company; and that precisely the same type of alleged infringing constructions and

precisely the same claims of precisely the same Letters Patent which were involved in the North Jersey suit, are involved herein. It may also be noted that complainants herein have produced the same expert and practically all of the same witnesses who testified in the North Jersey suit, which fact appears at or near the beginning of the cross-examination of each, and that their testimony is directed to the same end and covers the same ground. Defendant herein, however, has produced only two witnesses, and these appear for the first time in the present suit. Certain additional patents have been cited as references (~~fol.~~ 208-9, p. 70, D. R.). In brief, it appears that the subject-matter of this suit has now been adjudicated upon the merits by two Courts of Appeal in the same way.

#### Complainants' Admission Restricting the Issue.

In this connection attention is called to the fact that it was admitted by complainant in the North Jersey suit, in open court, that if the suit could not be maintained as to claim 13 of patent No. 627,898 it could not be maintained as to any of the claims of this patent. An inspection of the claims will show this to be obvious, but we quote Judge Bradford's decision, page 778, 124 F. R.

"It is only necessary to consider claim 13. It is admitted on the part of the complainant that unless this suit be maintained with respect to that claim it cannot be maintained as to any of the claims of Patent No. 627,898."

(See also p. 3 of Opinion; pp. 101-110 D. R., near bot.)

The same admission was made as to the inclusive character of claims 13 and 17 of the second Patent No. 327,900, although it is not specifically so stated in Judge Bradford's decision.

He says:

"The charge of infringement as to this patent, which contains nineteen claims, has been restricted to claims 13, 14, 15 and 17. It is unnecessary to refer to more than claims 13 and 17."

And complainants' expert Livermore admits that claims 13, 14, 15 and 17 of this patent "rest upon the like combination" with claim 13 of Brill Patent No. 627,898, (x-Q. 10, x-Q. 12, and answers, pp. 34-35, C. R.) and are, therefore, in accordance with the opinions of the Circuit Court of Appeals for the Third Circuit and of the Court of Appeals of the District of Columbia, void for want of patentable invention (pages 101-110, D. R.).

These first three claims, that is claims 13, and 13 and 17, of the respective patents in suit, it accordingly appears, cover everything vital in this suit as they did in the North Jersey suit and unless such claims can be sustained there is no cause for complaint by reason of any action of the defendant.

**Kessler vs. Eldred Strongly Persuasive as Not Conclusive upon Issue of Res Adjudicata and Want of Equity.**

The present case, in the light of the foregoing, is one eminently suited to the application of the above doctrine. Bitter and protracted litigation, involving the same questions, has now dragged over a period of nearly ten years, and this Court in accordance with equity and established practice under like circumstances, may well be asked to cut the Gordian knot. The circumstances in the present case fall little short of absolute *res adjudicata*, under the doctrine of *Kessler vs. Eldred*, 206 U. S., 285, in that a hotly contested suit involving the same complainants, the manufacturer (who was the predecessor, by purchase, of the present real defendant) being the real defendant in said suit,

the identical type of alleged infringing truck, the same patents, the same claims (with the immaterial difference that two claims involved herein and which admittedly "rest upon the like combination" with Claim 13 of the parent patent, were not finally adjudicated although involved), and in substance identically the same evidence as in the present case, has already been finally decided.

In accordance with settled procedure, this Court will be able to discern for itself from the decision in the Third Circuit that the character, extent and scope of complainants' proof has been in all cases, including the present, the same. The case of *Green v. City of Lynn*, 55 F. R., 516, 518, states the established practice with reference to ascertaining what was the evidence in any prior case:

"Therefore in applying the conclusions in *Andrews v. Hovey* this Court is: First, to inquire what facts are proven in the pending case by independent evidence given under the ordinary rules of law; and, Second, to examine the opinions of the Supreme Court, and the line of reasoning and conclusions which they exhibit, and from this or otherwise—but not by formal evidence—become satisfied whether or not the proofs of which the latter court took cognizance were substantially the same as those in the case at bar. If they were, its line of reasoning and conclusions bind the conscience of this court upon the questions of fact involved; otherwise they fail to do so, perhaps wholly, perhaps in part."

The decision in the North Jersey case settled as between the complainants herein on the one hand, and the North Jersey Street Railway Company, and the Peckham Motor Truck and Wheel Company its manufacturer and defender, on the other hand, that the trucks complained of might be freely and without the let or hindrance of these complainants manufactured, used and sold in the

Third Circuit. In the meantime the Circuit Court for the Southern District of New York had granted preliminary injunctions in suits begun upon the patents involved herein against the Peckham Motor Truck and Wheel Company and its successor, the Peckham Manufacturing Company, based upon a decision of the lower Court in the North Jersey case. The Court of Appeals for the Second Circuit, however, accepting the settlement and definition of the rights of the parties arrived at in the North Jersey suit in the Court of Appeals for the Third Circuit, reversed the Court of Appeals for the Southern District of New York in the Peckham Manufacturing Company case, which company had taken an appeal (p. 117, D. R.), and the said Circuit Court, in the Peckham Motor Truck and Wheel Company case (which company had gone out of business, its assets having been purchased by the Peckham Manufacturing Company), vacated its preliminary injunction "by consent" (page 116, D. R.). Accordingly, as indicated by the above action of the Courts in the Second Circuit, the right of North Jersey Street Railway Company, the Peckham Motor Truck and Wheel Company and the Peckham Manufacturing Company, to make, use or sell the alleged infringing trucks, was accepted and ratified to the full extent decreed by the Court of Appeals for the Third Circuit in the North Jersey case. As was said in *Kessler vs. Eldred*, cited:

"This judgment, whether it proceeds on good reasons or bad reasons, whether it was right or wrong, settled finally and everywhere, so far as Eldred, by virtue of his ownership of the Chambers patent, was concerned, that Kessler had the right to manufacture, use, and sell the electric cigar lighter before the Court. The Court, having before it the rights and respective duties on the matter in question of the parties to



the litigation, conclusively decreed that the right of Kessler to manufacture and sell his manufactures free from all interference from Eldred by virtue of the Chambers patent, and the corresponding duty of Eldred to recognize and yield to that right everywhere and always."

If the complainant in the North Jersey case still felt aggrieved, we submit that his duty was to apply for a writ of certiorari to the Supreme Court of the United States. It had become his duty to leave the customers of this defendant and its predecessors alone. Instead of doing this, however, a new suit against a user, the nominal defendant herein, was begun in the District of Columbia, and has been prosecuted at large expense to this Court. As was later said in the Kessler case:

"Leaving entirely out of view any rights which Kessler's customers have or may have, it is Kessler's right that those customers should, in respect to those articles before the Court, be let alone by Eldred, and it is Eldred's duty to let them alone. The judgment in the previous case fails of the full effect which the law attaches to it if this is not so. If rights between litigants are once established by a Court of competent jurisdiction those rights must be recognized in every way and wherever the judgment is entitled to respect by those who are bound by it."

If the North Jersey Street Railway Company had extended its tracks into the District of Columbia or the Peckham Motor Truck and Wheel Company had sold its trucks in the District of Columbia, it would become the duty of this complainant in accordance with the doctrine of the Kessler case to leave the user of these trucks alone, and we submit that this duty is not defeated merely because the Peckham Manufacturing Company

succeeded to the business of the Peckham Motor Truck and Wheel Company and continued the manufacture of the same type of truck. This complainant had begun suits against this manufacturer defendant and its predecessor manufacturer in the Southern District of New York, but instead of prosecuting the said suits in the face of the final adjudication in the Third Circuit, or instead of filing a petition for a writ of certiorari to the Supreme Court, he did that which we submit he had no right to do under the doctrine in the Kessler case when he began suit against another user in the District of Columbia. He did not discontinue harassing the customers of the real defendant herein, and its predecessor which defended the North Jersey suit.

We submit that, the previous litigation having been duly pleaded (p. 6, ~~D.~~ R.), the bill herein is lacking in equity and should be dismissed.

As will hereinafter be pointed out more fully in the discussion of the questions at issue, the defendant takes the position (1) that the two claims in suit of Patent No. 627,898, and Claims 13 and 14 of Patent 627,900 are unequivocally anticipated; (2) that all the claims in issue of both patents are void for want of patentable invention; and (3) that there is no infringement of the first patent if construed narrowly, nor of the second patent in any event. Either the second alone or the first and third taken together are sufficient to effectually dispose of the whole matter. Claims 13 and 81 of Patent 627,898 are also void because they involve double patenting in view of a prior patent of this patentee.

#### **The Patents in Suit.**

The patents in suit belong to an art in which thousands of patents have been granted. Many of these are for trucks adapted to be used in connec-

tion with vehicles propelled by steam or horse power, but as electric motors have come into use these structures have been adapted for use in connection therewith by slight modifications and judicious selection clearly within the knowledge of any competent mechanic. For the past ten years the activity in the art has been mainly directed to strengthening and improving these trucks, old in principle, in order to meet the conditions of largely increased traffic. It is not a new art, and it is not an art in which any remarkable advances have been made.

"Under the proofs it is very clear that the art of truck construction, whether relating to car trucks generally, or to trucks employed in passenger service in connection with electric propulsion, was old and in a highly advanced state at the time Brill made these patented improvements." (Opinion C. C. A., Third Circuit, pp. 101-110, D. R.)

The specification of Patent No. 627,898 states, at line 9, page 1:

"My invention relates to improvements in car trucks *generally*, and it has special relation to improvements in car trucks designed for the purpose of carrying a motor for electric propulsion and the like."

The specification describes the various parts of the truck and ends with one hundred and eleven claims. It will only be necessary to refer to the specification so far as it relates to the claims in controversy, and, therefore, to simplify the case, attention will be first called to the claims. These both involve the following elements:

1. A truck frame.
2. Spring links depending from the truck frame.
3. Semi-elliptic springs connecting the links.
4. Means (a bolster) for connecting the semi-elliptic springs with the car body.

Claims 13, 14, 15 and 17 of Patent No. 627,900 embody the same elements, but refer more particularly to the details of spring-link construction, and, more specifically, this patent being divisional, to the precise form of link construction illustrated therein. The parent Patent, No. 627,898, will be discussed first, the divisional and secondary patent being referred to toward the end of the brief.

**Disclaimer in Patent No. 627,898.**

Brill disclaims the location of the spring links and semi-elliptic springs. He says in the specification of Patent No. 627,898:

"The location of the *semi-elliptic* springs *outside* of the wheel gauge on each side of the truck, together with the location of the *links* for supporting the semi-elliptics *closely adjacent* to the axle-boxes, and the swinging of said *springs* from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck transoms within the wheel-gauge. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the 3rd day of November, 1896, Serial No. 610,902, and therefore *I do not claim the same herein*" (see lines 119-133 of page 2 of the specification).

The disclaimer is also an admission that it was old in the art to support the bolster by links from the truck transoms within the wheel gauge.

In view of these two admissions in the disclaimer, the patent, so far as it relates to the claims in controversy, is void upon its face.

Generally speaking, the truck is what is known as a centre-pivotal truck, and, while the specification is silent upon the point, it is insisted that it is also a short wheel base, low-hung truck. The claim

that this is a new type of truck, or that it was the first centre-pivotal short wheel base truck devised by any one, is absolutely groundless.

#### The Claims Limited to a Specific Part of a Car Truck.

Furthermore, the claims in controversy are only for a combination of elements relating to a *specific part* of a truck, that part of a truck which has to do with supporting a car body on a spring-suspended bolster. An inspection of these claims will show not the slightest reference to any of the elements which complainants have attempted, in previous litigation and argument, to import into them in order to give color to an assumption that we are dealing with a *new type* of truck. The claims are bare of mention of the fact that we are dealing with a construction adapted to receive *two motors* to the truck or characterized by a *short wheel-base*, or which is *low hung*, or in which the hangers are located *closely adjacent* the axle-boxes, or in which *longitudinal motion* of these hangers is either desirable or a requisite. Complainants' witnesses Livermore and W. S. Adams unqualifiedly admit this (x-Qs. 6-7 and Ans., p. 188, C. R.; x-Q. 406 and Ans., p. 246, C. R.). It would be necessary for the Court to read the other 109 claims in the patent before a single one of these features is found. The recent case of Canda Bros. v. Michigan Malleable Iron Co., 123 Fed. Rep., 95, is directly in point. Paragraph 1 of the syllabus correctly states the law:

"1. While an element may be implied and read into a claim of a patent, when necessary, for the purpose of proving that the device is an operative one, it cannot for the purpose of making out a case of novelty or infringement."

We shall show hereafter that, even if they were embodied in the claims in question, the same were

utterly old in the art in precisely the same relations, and that, accordingly, they cannot impart validity to or carry the claims. The latter admit of an interpretation no broader than they read.

It may here be noted that the trucks alleged to be built under the patents in suit are the Brill 27 B, 27 C, 27 D, and 27 G trucks. These vary in standard length of wheel base from four feet (27 G) to five feet nine inches (27 B) (Ans. x-Qs. 98-9, p. 60, C. R.), all of which are claimed to have broadly the same type of spring system. The motors in the 27 G construction which, as will hereinafter appear, have had a larger sale than all the other lettered constructions put together, are hung *outside the wheel base* (x-Qs. 77, 92, 96 and Ans., p. 57, 59, C. R.). The wheel base of defendant's trucks is four and a half feet (Ans. x-Q. 43, p. 15, C. R.).

Even Judge Bradford, sitting in the lower court in the North Jersey suit, was compelled to admit (124 F. R., 778) :

"There can be no doubt that in a broad sense all the elements entering into the combination of Claim 13, were old and well known. At the time the invention embodied in that claim was conceived there was, generally speaking, nothing patentable in such spring-link, semi-elliptic springs or other elements, separately considered, as entered into the combination claimed."

But irrespective of the foregoing, it may be well to show at this point how entirely groundless is the contention that the patent is for a *new type* of truck, thereby enabling this Court to more easily and intelligently consider the claims in controversy. This is conclusively shown by reference to a single one of several patents of the prior art. This patent is to John Taylor, No. 507,855, October 31, 1895 (Defendant's book of Patents or T. R., 355).

## Type of Truck Old.

TAYLOR PATENT NO. 507,855.

The parts of the specification of the Taylor Patent specially pertinent are as follows:

"This invention is an improvement in car trucks, and is especially designed for electric railway cars wherein two four-wheeled trucks are employed, one at each end, such trucks being commonly termed 'pivotal' trucks.

"The objects of the invention are to produce a pivotal truck having a short wheel base, and wheels of equal diameter and the pivot on a king bolt connected to a bolster located centrally between and above the axles so as to allow ample space for the reception of electric motors at either side of the bolster."

\* \* \* \* \*

"Other objects are to overcome jarring, pounding and rocking the car body by the passage of the truck around curves, or over rail joints, switches, crossings, &c., by mounting the truck frames on the axles by long coiled springs over each journal, and by employing full elliptical springs, one on each side of each side beam intermediate the wheels, upon which springs the bolster is supported."

"Another object of my invention is to provide a pivotal truck, which when used in electric cars will admit of their being run at a high speed around curves with perfect safety, and without any necessity for slowing up, as it is generally necessary to do when the trucks for electrical railway cars are used, and by my constructions the cross beams on each side of the truck bolster which have been employed in pivotal trucks for steam cars are done away with, thus enabling the wheel base to be smaller than where they are used, and yet my truck frame is simple, strong and durable, and will be

positively safe when running at a high rate of speed."

\* \* \* \* \*

"I would further add that semi-elliptic springs may be sometimes employed instead of the full elliptic springs, and when 'elliptical' is used referring to springs both full elliptic and semi-elliptic springs are embraced."

Lines 11 to 22; 30 to 38; 48 to 62,  
page 1. Lines 32-36, page 3.

"Defendant's Exhibit Proportionate Wheel bases" (proved p. 51, ~~D. R.~~) indicates the respective wheel bases in various patents referred to (~~Rear of D. R.~~). *p. 37*

It appears, therefore, that four years before the application for the patent in suit was filed, center-pivotal short wheel base trucks designed to be propelled by electricity were old, and that in such trucks the bolster was to be supported either on full elliptics or semi-elliptic springs located on the outside of the side frames intermediate the wheels.

Moreover, although, as previously stated, there is no mention in the claims here involved of the fact that universal movement is permitted to the bolster, complainants' own witness Akarman, produced as a practical railroad man, stated as follows:

"x-Q. 73. Your answer applies equally then to railroad traffic from the time when electricity was first used as a motive power? Was there nothing especial which called for a longitudinal and lateral motion similar to that possessed by the Brill 27 G trucks?

"A. *There has always been provision made for lateral and longitudinal motion in every well constructed truck. The provision for acquiring this motion is different in different types of trucks.*

"x-Q. 74. Then longitudinal and lateral motion of car bodies is as old as electric railroading itself?



*"A. It is as old as the first types of single trucks that made provision for such motion"*  
(pp. 85-6, C. R.).

It accordingly appears that if complainants are to succeed in the present action, they must rely upon the claims themselves and not upon alleged new characteristics arbitrarily imported into them. It is the naked fact and not one garbed in rainbow raiment which must be dealt with; and this same fact shows not only that we are dealing with an old type of truck, but, as will hereinafter fully appear, an old arrangement of the specific construction set forth and claimed in the patents in suit.

#### **Steam and Electric Car Truck Art the Same.**

At this point it may also be well to say that car trucks are car trucks whether propelled by steam or electricity, so that when a combination of elements found in a car truck designed for use on a steam railroad is taken from such a truck and incorporated into a truck designed to be propelled by electricity there is no patentable invention disclosed and the former is a pertinent reference for the latter. No clearer exposition of this rule can be found than in the analogous case of *Johnson Co. v. Toledo Co.*, 119 F. R., 885, decided by the Court of Appeals of the Sixth Circuit wherein, at page 889, it is said:

"It may be admitted that in none of these earlier patents do we find any precise anticipation of Moxham's device. But when the change from horse cars to electricity occurred, and heavy cars running swiftly upon sunken tracks in city streets raised the problem of how to deal with the question of the wear at the intersection with other lines, it would naturally occur to the street railway constructor to study existing methods

in the allied industry of ordinary steam railways. We are not insensible to the fact that the old switch structure was not well adapted to the paved streets of a city, where the rails are sunken to diminish the inconvenience of ordinary street traffic. Neither is the switch work of an ordinary railroad subjected to the constant succession of jars and hammering blows incident to the multiplied traffic of a street railway intersection. That a flange bearing of removable hardened metal is required by a street frog or switch is due to the narrowness of the usual street car wheel and its consequent tendency to cut or dig a path in the floor over which it passes in going from one rail to another; a tendency not so noticeable in an ordinary railroad because of the wider tread of the car wheels and far less use. So it was comparatively easy and cheap to take up and replace the whole frog when the structure was on top of the ground, while the paved streets of a city and the sunken rails required a switch structure difficult to remove, and rendering a removable wearing center much more desirable and economical, even if the wear were no greater in the one situation than the other. While, therefore, street and ordinary railway switch structures belong to the same general art, it is plain that the conditions presented by the modern street railway would present problems somewhat differing from those met by the early patents we have referred to, which were well adapted to the ordinary railroad and also to the horse street cars. Nevertheless, it is a far-drawn argument to say that the devices from Griggs to Moxham were a mere groping after the advantages first realized by the latter. The developments from the devices of Griggs, Curtis, Lewis and others were not brought about by the defects of those appliances when applied to the railways they were intended to subserve, but by the new conditions brought about by the modern street railway service."

Complainants themselves admit the identity of the steam and electric car truck art. Defendant's Physical Exhibit, Brill Catalogue by John A. Brill and entitled "Parallel in the Development of the Locomotive and Electric Truck," shows the obvious fact. The following excerpts are taken from this catalogue:

"There is a remarkable and interesting parallel to be found in the successive steps by which the locomotive and the electric trucks have been developed" (page 1).

"The electric truck is a locomotive in its essential functions. It differs from the locomotive in having the additional duty of carrying the car body and hence must be a carriage as well as a locomotive. The electric truck builders of to-day occupy a place relative to the art similar to the early locomotive builders. Like the early locomotive builders they are discarding the composite form after having in their early efforts given it an effective trial. *Advanced locomotive truck builders have followed locomotive precedents in the introduction of a solid bar frame*" \* \* \* (page 2).

Again, complainants' own witness bears this out. Harrington, a practical railroad man, says in answer to direct-question 19, page 114, C. R.:

"The *adaptation* of the center pivotal truck as represented in the 27 G Brill and 14 B-3 Peckham, marked a very substantial and necessary development *in the use of railway trucks for trolley purposes.*"

Whether the car trucks of the prior art hereinafter to be called to the attention of the Court were primarily designed for steam railways or carriages is wholly immaterial when the structures referred to in the claims are taken bodily from the prior art. The patentee recognized this when, in his

statement of invention, in line 9, page 1 of the specification, he says:

*"My invention relates to improvements in car trucks generally."*

#### Brill's Contribution to the Truck Art.

We first find Brill seeking to hold up the commercial scarecrow of "Patent pending" nearly a year and a half before a single application covering the constructions of the patents in suit was filed. Such was the mark upon the trucks which it is alleged were shipped March 28, 1895, by the Brill Company, although the applications for the only patents covering the same (answers to x-Q. 57, p. 54, C. R., and 79, p. 57, C. R.), the patents in suit, were not filed until July 3, 1897.

The reason for the existence of the Brill trucks built under the patents in suit, as well as of the corresponding trucks manufactured by some nine or more other manufacturers is disclosed by complainants' own witnesses. Complainants' expert, Mr. Livermore, in his rebuttal deposition, expresses the belief that the claims in suit involve patentable invention, not to say wonder that any doubt thereof could be expressed, because he does not find that the specific Brill construction was ever evolved before. And yet, taking his position as it reads, complainants' own witnesses state the reason. Harrington, in answer to Q. 14, page 113, C. R., says:

*"The early development of railway rolling stock was along the lines of longer cars and the placing of the Maximum traction truck, so called, was the result of this demand. \* \* \*"*

After testifying that the important feature of the Maximum traction truck (big and little wheels) was its adaptability for radiating under car bodies, he states in answer to Q. 15, page 113, C. R.,

the causes which lead up to the adaptation of the structures of the prior art by Brill and numerous other makers:

"The Maximum traction truck was found to be quite destructive to track. *The development of trolley roads into suburban districts brought about the requirements* of still higher speed, increased power, which was not found in the Maximum traction truck, being limited to use of two motors per car, \* \* \*"

In summary, upon this point, it appears that no demand had existed for any such truck upon electric railways as the Brill 27 G, the Peckham 14 B-3 or the eight or nine other corresponding trucks upon the market prior to the date of their introduction, but that, when the demand did begin to be made, recourse was at once had to the Thyng truck, to the Taylor truck, to the Brill and Curwen truck, or to any one of many in the prior art which disclosed the features and utilities of the *constructions* of the patents in suit. It is observable, also, that these requirements were for features not present in the claims in suit, namely, for low hung, short wheel base trucks capable of carrying two motors to the truck, which features belonged to the Taylor and the Brill and Curwen trucks, among others, long prior to the time when they were appropriated by the patentee of the patents in suit. Brill must personally have known that these features were old, for he was one of the patentees of the Brill & Curwen truck, and accordingly did not claim them, although the disposition has certainly been shown to claim everything in sight. In no suit has he been produced as a witness. As was well said in *Miller Company v. Meriden Company*, 80 F. R., 523, at page 525:

"The development of new industries, the discovery of new products, the adaptation

of old materials to new uses, may suggest improvements upon devices of the prior art, the principles of which are already sufficiently disclosed although not fully developed, *because not demanded by the prior existing conditions.* In the application of this doctrine, patents have been held void for improved stamps required by new Internal Revenue laws; for new adaptations of gate guards for elevated railways; new forms of bicycle bells, pedals and rubber tires."

The recent case of *Canda Bros. v. Michigan Malleable Iron Co.*, referred to hereinbefore, summarizes the position which the courts have assumed toward questions such as are in issue.

We quote from page 101, Fed. Rep., 123:

"The history of the art presents innumerable examples of this class of mechanism so nearly identical with those here involved that the selection of the elements of a patentable combination from prior devices in this field has become as difficult as the production of original mechanism which would owe nothing to prior inventors. Perhaps the later constructions exhibit more mechanical skill and improved reinforcement of those parts of the apparatus most subjected to strain and injury by concussion; but these advantages are but matters of degree, not of inventive capacity and merit. The art has conserved the generic features of the early devices. The changes introduced in late years in the arrangement of the parts, or the manner of attachment of the casing to the timbers of the car, *and relative positions of the drawbar and springs, and other parts of the various devices, are, in the main, model merely, and have not the essence of invention.*"

Giving Brill all the credit that is due him, it must be said that when he grouped together the elements combined in the claims in suit he had only

to make selections from devices of the prior art. So far as such selections are set forth in claims of specific character he may ask for the consideration of the Court, but when he seeks by generic claims to shut others out from an equal right to use the devices of the prior art he is not entitled to any consideration whatsoever. His position in the art is a common one and of which it has been said:

"In every new manufacture many improvements are naturally suggested and made from time to time as a matter of course. The patent law is not intended to secure a monopoly of all the natural developments of a general principle to the one who happens to make some special construction embodying it a few weeks in advance of others, when it appears that such improvements were certain to be made in a short time."

North British Rubber Co. v. Jandorf,  
85 F. R., 451-455.

#### **Alleged Gist of Invention.**

Quoting from the decision of Judge Bradford in the lower court in the North Jersey case (124 F. R., 778), which complainant's expert Livermore reiterates in different language in answer to x-Q. 22, page 38, C. R., we find the alleged gist of the invention defined as follows:

"The gist of the invention of this patent principally lies in the construction and arrangement of the flexible spring connection between the truck frame and the car bolster so adjusted as to provide relatively to the truck frame a vertical spring movement and also a longitudinal and transverse yielding horizontal movement of the bolster supporting the car body, thereby relieving the car body from shock, jerk or jar in the starting or stopping of the car, or in its passage over inequalities or curves in the rails of the truck."

And we also find that this "gist" is not only a characteristic of certain truck constructions of the prior art, but has always been present, as complainant's own witness Ackarman puts it, in "every well constructed truck" (Ans., x-Q. 73, p. 85, C. R.).

### The Patents of the Prior Art.

Before referring specifically to the second patent in suit, No. 627,900, or to the defendant's car truck, it will be well to call attention to the prior art showing what the patentee, the defendants and the public at large had the right to utilize in the construction of car trucks.

THYNG PATENT NO. 4276 AND BEACH PATENT NO. 173,257.

These patents will be considered in conjunction.

This Court will see at a glance that the Thying Patent shows and discloses every feature of the two claims of Patent No. 627,898 save that of elastic links, and in place of those it has non-elastic jointed links. This was admitted by Mr. Livermore, complainants' expert, in the North Jersey suit, and appears at the bottom of page 180 of the printed record of complainants in this case:

"The first is the Thying Patent No. 4276, dated November 18, 1845. My comparison of the structure shown in this patent with the Brill truck has before been fully given. It does not disclose a car truck embodying the combination of a truck frame having side frames, a bolster, longitudinally arranged semi-elliptic springs supporting the ends of the bolster, and elastic links or elastic or extensible suspensions of any kind connecting the ends of the semi-elliptic springs with the side frames. It does, however, embody a combination including all of the above named elements, except the elastic and extensible links, and it has non-elastic links jointed for transverse swinging to con-



nect the ends of the semi-elliptic springs with the side frames."

It does not, however, require the aid of any expert to enlighten the Court as to the structure of the Thyng Patent. It discloses—

(1) A truck frame.

It will be noted that Brill in his specification at line 45, page 1, states that he makes no claim to the truck frame, and the claims in controversy are not limited to any form of truck frame.

(2) Links depending from the truck frame. These links are non-elastic links and not spring links.

It also discloses—

(3) Semi-elliptic springs connecting the links.

It also discloses—

(4) Means (a bolster) for connecting the semi-elliptic springs with the car body.

This patent, standing by itself, leaves nothing for Brill except "spring" links which he has substituted for the "non-elastic" links, and the spring links are disclosed and claimed in the Brill and Curwen Patents referred to in the disclaimer and in a host of other patents among which are Beach, Haskins, Heffernan, Boughton, Peckham, Overbagh and others.

If the Court will now turn to the Beach Patent which was not before the Court in the New Jersey case (p. 76-D. R.), it will note that it discloses a spring hanger, best shown in Figure 7, of the drawings of that patent, and which is indicated by H. Beach says that his invention in part resides

"in the peculiar construction of the springs in such a manner that their hangers are free to vibrate or oscillate in any direction."

Line 13, page 1, of the Specification.

Later on he says:

"I do not wish to be confined to the particular form of truck spring shown, as it is evident that any other style of spring may be used which will permit the hangers to oscillate from or on their top connections."

Last paragraph, column 2, page 1, of the Specification.

In the paragraph preceding the last quoted he says:

"The advantages of this method of hanging the car are: first, the truck is free to sway laterally, and to accommodate itself to inequalities in the track, without communicating such motion to the body of the car or at most to a small extent, doing away with the concussive gauge motion experienced where the car body is rigidly swiveled to the truck by the king-bolt and centre bearings."

Returning to the Thyng Patent which shows what is the gist of the invention as defined by Judge Bradford and complainants' expert, we find a car bolster supported on semi-elliptic springs and supported by links so that there is provided a "flexible spring action between the truck-frame and the car bolster." The semi-elliptic springs upon which the bolster rests give this flexible spring movement. The arrangement and adjustment are such as to provide for the bolster both a vertical spring movement and a longitudinal and transverse horizontal movement. That there is this vertical spring movement and this transversely-yielding horizontal movement admits of no denial. An attempt has been made to show that there is not a longitudinally-yielding horizontal movement of the bolster, or of the shackles under extension of the semi-elliptics, but that this is utterly unfounded we will show hereafter in speaking of the Pyott tests of the Thyng truck. When Pyott admits that it is

a good truck for steam railroading up to a speed of from 12 to 20 miles an hour, he *ipso facto* admits the presence of this movement (x-Q. 67 and A., p. 105, C. R.).

When the substitution of the Beach hanger for the hangers in the Thyng truck is made, everything disclosed by Brill so far as the claims in controversy are concerned would be disclosed and the same results accomplished. The proposition is too clear to require argument. The claims of the Brill Patent are for a specific portion of the car-truck—a bolster supported upon semi-elliptic springs, which springs at either end are suspended from the truck-frame by spring-hangers. All that Brill claims to have done is to have taken such spring and to have placed it in the car-truck. He took the Thyng spring-supported bolster and substituted for the Thyng links the spring-links of the prior art—specifically, the links substantially as shown in Figure 1 of the Patent to Haskins, No. 330,033. The defendant took the Thyng spring-supported bolster and substituted for the Thyng links the links of the Beach Patent. Patentability, in the light of a wealth of prior art, cannot be predicated upon this.

**Complainants' Witnesses Acknowledge No Invention in Remedying Alleged Defects in Thyng Truck, and in Substituting Spring Hanger.**

It is submitted that the defendant had the right to make the substitution above indicated. It is an elemental rule that it does not involve invention to substitute in an old combination an element found in another old structure where no new mode of operation is produced. Defendant's Exhibit, "Thyng Side Bar and Spring with Beach Spring Hanger" shows conclusively that the Beach spring hanger can be substituted bodily for the Thyng non-elastic hanger. To make this substitution would

not involve invention for various reasons, among which are:

(1) That no change is required to adapt the link for its new use.

(2) The two links, Thyng and Beach, are both used in car trucks.

(3) They are both used for suspending the bolster from the truck frame.

The testimony of complainants' own witnesses is convincing upon this point, as upon question of remedy for the alleged lack of provision for longitudinal movement of the semi-elliptic springs, Harry L. Adams, Superintendent of the shops of the United Railways and Electric Co. of Baltimore, produced by complainant as a practical railroad man and truck builder, testified as follows (p. 92, E. R.):

"x-Q. 40. Please look at 'Defendant's Exhibit Model Thyng Truck' and state whether or not, if such were desired, you are competent to provide for additional lengthening or splaying out of the semi-elliptic springs?

"A. \* \* \* In order to provide for an addition of this kind, the two links connecting the point of support on the truck-frame with the point of support of the half-elliptic springs should be arranged at right angles to their present position, thus allowing them to swing in a direction parallel with the side of the truck frame; or another set of links would have to be added, or something similar, to provide for this motion or splaying of the ends of the half-elliptics.

"x-Q. 41. Would you have been competent to make this addition or change in the year 1894 or 1895?

"A. Had I met this problem at that time, I consider that I would have been capable of meeting the same."

Complainants' witness Pyott, who made the alleged tests of the Thyng truck, which will be hereafter discussed, testified as follows in this point (pp. ~~94-5~~, C. R.) :

"x-Q. 91. Please look at 'Defendant's Exhibit Model Thyng Patent' and state whether or not, if such were desired, you are competent to provide for additional lengthening out of the semi-elliptic springs?

"A. The distance between the pedestals limits the length of the springs. *There is ample room for the expansion of the springs. I feel myself competent; yes.*

"x-Q. 94. Wouldn't you have been competent to provide for an additional lengthening of the elliptic under compression by some other device, possibly not including a spiral spring?

"A. My mechanical knowledge would have prompted me to provide for this action in some manner.

"x-Q. 95. You could have provided some method based upon your mechanical knowledge, then?

"A. I think my previous answer covers that, if there is necessity for such a provision."

The witness acknowledges in answer to x-Q. 158, p. ~~104~~, C. R., an even more positive statement, quoted hereinafter.

The testimony of complainants' witness Harrington is even more illuminating (pp. ~~119-120~~, C. R.) :

"x-Q. 42. Please look at Complainants' Exhibit, Pyott Photograph No. 1 and state whether or not, if the problem had presented itself ten years ago, you consider that you would have been competent to provide practical mechanical means for allowing an unrestricted extension of the semi-elliptics and consequent outward play of the spring supports or shackles if such longitudinal play had seemed to you desirable?

"A. Yes.

"x-Q. 43. If you had considered that the supports or shackles connected to the ends of the semi-elliptics required cushioning, in order to provide a better or more desirable spring support, and you had had before you at this time either the Peckham 14-B-3 links or the Brill 27-G links, or the links illustrated by 'Defendant's Exhibit, Overbaugh Spring-hanger,' would you consider that you would have been competent as a practical mechanic to substitute any of these latter hangers for those shown in the photograph referred to?

"A. I do.

"x-Q. 45. Do you consider that if you had directed a skilled mechanic, skilled in the art of truck building at the time aforementioned, to obviate these defects above noted, and had shown him all or any of the three previously mentioned hangers, he could have made the substitution of one for the other—I mean for the Thyng hangers?

"A. \* \* \* In so far as the question pertains to the use of the Brill hanger" (which is substantially the Haskins) "as compared to the Peckham hanger" (which is substantially the Beach), "the results, as stated above, are parallel, and a *skilled mechanic would be influenced in the selection of either upon the same grounds that apparently entered in in the design of the trucks.* The Brill truck is a wrought frame; the Peckham a cast frame.

"x-Q. 46. The last paragraph of your last answer would be the same, would it not, if, instead of Peckham and Brill hangers, any other hangers had been provided which would, as a matter of fact, obviate the two defects above-mentioned; namely, lack of the desired longitudinal play of the elliptic hangers and lack of proper cushioning means for this play?

"A. If the other hangers referred to by you had all the qualities of the Peckham and

Brill hangers, the same, of course, could be substituted."

The same witness discussing the Thyng truck, disassociated from the question of specific hangers, upon *direct-examination*, testifies (p. 118, C. R.):

"Q. 39. Starting with the truck shown in the two Pyott Photographs Nos. 1 and 2, state whether it would have occurred to you in 1895, to devise therefrom a truck of the construction of 27 G Brill or 14 B-3 Peckham?

"A. Having invented quite a few devices, I can appreciate that the logical processes through which the form of truck, as shown on the photograph and that shown in the form as represented in the 27 G or 14 B-3, *would be a natural result.*"

Counsel for complainants, being, naturally, somewhat disturbed at such an answer, tried again.

"Q. 40. My question (Q. 39) was a little different from that. It was as to whether it would have occurred to you, say in the year 1895, if you had seen the truck of the Pyott Photographs, to have devised trucks of the said Peckham and Brill type?

"A. As stated above, I believe that if I had been working in the development of a truck, and knowing the requirements as they then existed, that it would have occurred to me, after having analyzed the details of construction as illustrated in the Thyng truck, that the form of truck as shown in the 27 G or 14 B-3 would have been the invention resulting therefrom." p. 397.

The witness uses the term "invention," but in such connection throughout as to preclude the possibility of this Court's finding any invention at all.

It will, accordingly, be seen from the foregoing that, given the occasion, which electrical development finally produced, the question of the substitu-

tion of the spring-hangers of the prior art for each other, according as one method or action was desired or not was obviously a mere matter of choice. The teaching of the prior art concurs with the testimony of complainants' own witnesses, and this Court can hardly find "invention" as a matter of law where none existed as a matter of fact.

**Other Patents Show Every Element of the Claims except Having Non-elastic Links in Place of Spring Links.**

ROMANS, No. 234,270, JANUARY 28, 1862.

This patent shows, at the right of Fig. 2, a pivotal truck, having a swing bolster which is suspended from the truck frame by semi-elliptic springs and pivotal links adapted to swing *longitudinally* of the truck.

ADAMS, No. 538,858, MAY 7, 1895.

This patent shows the frame, the links depending from the frame, the semi-elliptic springs connecting the links, and means connecting said latter springs with the car body, the only difference being that the links are not elastic.

BAKER, No. 553,298, JAN. 21, 1896.

In Fig. 1 there is shown the identical construction called for in this claim, save that the longitudinally pivoted links *d d* supporting the ends of the semi-elliptic springs are not spring links.

These four patents, namely, Thyng, Romans, Adams and Baker, have been selected out of a large number in the prior art, in order to show trucks embodying all the elements of the claims in controversy, save that the links are not spring links.

In connection with the Thyng, Romans, Adams and Baker patents we will consider the question of substitution.



**Is Patentable Invention Involved in Substituting for the Non-elastic Links of the Thyng Patent or the Others Above Referred to the Spring Links of the Prior Art?**

It is submitted that this question must be answered in the negative. The prior art is replete with a multiplicity of spring links for supporting the ends of semi-elliptic bearing springs embodied in a variety of structures.

**PECKHAM PATENTS, NOS. 464,253 AND 563,685.**

The spring links in these Peckham Patents are used for supporting a load (the nose of a motor) so that it may have a universal and swinging motion, which is exactly the function broadly of the sprink-links of the Brill Patent in suit. In the Peckham Patent, No. 464,253, this motor supporting link is shown in detail in the two views of Fig. 3, and is there used, not for supporting the heel of the motor directly, but for supporting one end of the cross-bar F, one of these links being connected to each end of the cross-bar, exactly as a link is connected to each end of the semi-elliptic spring in the Brill Patent, and with the load supported at a point midway between the links, as in the said patent. The said link *j* is cushioned both below and above the projection P<sup>11</sup> of the frame, from which it is supported by rubber springs, and as set forth in line 35, page 2, of the specification, in order to allow the motor support to rock laterally, the eye through which the bolt passes is made sufficiently larger than the bolt to allow the latter to move laterally.

In the Peckham Patent 563,685, a motor-supporting device is shown (most clearly in Fig. 4), wherein again are spring-links, or rods 29, as they are called in the patent, having spiral springs supported thereon for cushioning the movements of the motor hanging bar 28, one of these links or rods

being supplied for each end of said bar, and the upper ends of said rods passing through an enlarged opening in a casting 32, supported on the frame, and having a ball and socket bearing on said casting. It is stated, lines 102-105, page 1, "By this construction of motor support the requisite flexible connection is secured for the heel of the motor."

With respect to this patent it may be noted that the Circuit Court of Appeals for the Third Circuit quoted with distinct approval the view of defendant's expert, Mr. Abbott, in the North Jersey case (Opinion, p. 7, pp. ~~101-110~~, D. R.). Defendant's present expert entirely agrees with Mr. Abbott upon this question of the substitution of a motor-supporting link for a swinging link in the truck construction, and his reasons for his opinion are clear and unequivocal. He states (fol. ~~101~~, p. 34, D. R.) :

"This Peckham Patent shows in Fig. 4 a universally movable spring link which has at its upper end a ball and socket joint connection with the upper side of a truck frame bar, and it embodies a spring with which the part it supports, engages. Peckham employs this spring to support the motor in his truck, but obviously it is immaterial whether the load supported by the universally swinging elastic link of Peckham be a portion of the weight of a motor or a portion of the weight of a car body. The construction and operative relation of the parts being once understood, are adaptable within the common knowledge of any ordinary mechanic to a variety of mechanical constructions."

Figure 3 of Peckham Patent No. 464,253 shows a spring-link which is *practically the same as the construction shown in the Uebelacker Patent and employed in defendant's truck* (as complainant's expert, Mr. Livermore, stated in the North Jersey

case), except that the latter has spiral springs instead of rubber cushions to support the upper end of the link. In other words, the Peckham Company, which built the truck alleged to be an infringement, *simply used the same spring-link before used for supporting a motor for supporting the car body*. And yet Mr. Livermore passes over this patent, the one previously mentioned, Peckham Patent No. 424,723, and the Patent to Beach, No. 174,257, previously discussed in connection with the Thyng truck, all of which disclose spring-links in a truck adapted to have *universal* movement, with the statement that "the spring-links in the Beach construction perform about the same function as a bolster support that the spring links shown in the Peckham Patents above referred to perform as a motor support, and illustrate such changes in construction as might be found necessary or desirable in employing a spring link for one or the other of these uses" (p. 170, C. R.). By this very statement he recognizes the ready adaptability which each of these links has for various kindred uses in a car truck.

It comes simply to the question of analogous art or double use. The *mechanical construction* of the two devices whether in a truck structure or in a motor support, is admittedly the *same*. The question, then, is, as the law is laid down in the decisions, whether the two arts are so closely analogous that one working in one art would be supposed to be familiar with the requirements of the other and would be in a position to perceive the adaptability of a device in one art for use in the other. On this point the testimony on cross-examination of complainants' own witness, Walter S. Adams, who testified in the North Jersey suit, is instructive. Note the questions and answers which begin on page 56 of Complainants' Record, as follows:

*"x-Q. 72. Is the problem of motor suspension and the proper cushioning of the motor from shocks, jerks and jars one of the problems of truck construction?"*

*"A. Yes, it is."*

*"x-Q. 73. As a practical car truck man, is it not a fact that where one wishes greater strength in a truck, stronger parts are used, or the same are re-enforced?"*

*"A. Yes."*

*"x-Q. 74. And when one desires more spring action a spring is employed, is it not?"*

*"A. Where more spring action is required, it can be obtained by an additional spring, or by making a single spring with more movement."*

The testimony on this same point which the witness gave in the North Jersey suit is interesting. It appears at page 68 of Defendant's Record herein; moreover complainants' witness Akarman forcibly acknowledges this in answer to x-Q. 59, p. 84, C. R., and adds, *"and the character of the spring is greatly dependent upon the conditions of construction."*

Adams' North Jersey testimony is as follows:

*"Q. 11. State whether or not you consider motor suspension and location as being parts of the problem of truck structure and construction."*

*"A. The motor suspension is a part of the truck construction, and is generally furnished with the truck, and I am familiar with the various styles of suspension that are used; both in the details and their operations."*

The complainant is bound by the testimony of his own witness on this point as to the truth of the well known fact that questions of motor suspension and questions of truck structure are in one and the same art theoretically and practically. Hence

it is clear that if a device used as a motor suspender can be adopted *bodily* as a suspending element in a truck structure, there is then no invention involved in so adopting it.

OVERBAGH, No. 104,876, JUNE 28, 1870.

This patent which was not before the Court in the North Jersey case (p. 70, Deft.'s Record), illustrates spring links which support the ends of rigid equalizing bars from the side frames of a truck. We speak of these links as "spring links" because they are *spring-supported* links. If they are not spring links, then, as will later appear, defendant's links are not spring links, for their character as "spring" links comes from their being supported at their top ends by spiral springs precisely as in the case of the Overbagh. The latter link, moreover, is pivotally connected to the equalizing bar, as appears in Figure 1 of the patent, to allow for *longitudinal motion*. The specification near the end indicates the possible desirability of a pivot to allow for lateral motion as well.

"In the drawing I have shown a single joint at one end of the equalizer, but it may be necessary to use a double joint to allow for the motion of the bar."

As shown in "Defendant's Exhibit Model Overbagh Spring Hanger," the double joint indicated has been included so as to allow for any desired amount of cushioned universal movement, and the ready adaptability of this hanger for use in supporting a semi-elliptic spring instead of a rigid equalizing bar is indicated. An attempt has been made to show that these links did not give the universal "cushioned" movement that is claimed for the spring links of the patents in suit. Even if this were true it is noteworthy that complainants' witness Price, on being asked how he would ob-

viate such a defect says he would "make the holes through which these bolts pass in the side frames large enough to allow the bolts the desired swing" (Ans. to x-Q. 79, p. 150, C. R.). That this is groundless, however, is indicated by the testimony of complainants' witness Pyott who testifies that it is solely the presence of the ball-joints or semi-spherical heads 29, and not the presence of the spiral springs, which allows universal movement to the Brill hangers of the Parent Patent No. 627,898, since he admits in answer to x-Qs. 76 and 77, page 74 C. R., that the stirrup and the bolt must swing in unison and cannot swing independently of each other. That this is obviously the fact will be seen from an inspection of Figure 2 of the parent patent in suit, since the stirrup fits the bolt closely. This is also true with reference to the Brill secondary Patent No. 627,900, as stated at page 2 of the specification, line 52 and on, and as illustrated in Fig. 3.

It accordingly follows that a cushioned universal movement can exist in the Brill links only when there is a vertical pull upon the spiral springs, and that this is equally true of the Overbagh spring hanger. If the Brill links have a universal cushioned movement, so does the Overbagh hanger, and this in precisely the same relation and part of a truck.

COOKE, No. 595,045, DECEMBER 7, 1897.

The filing date of this patent is prior to that of the patents in suit, and in accordance with stipulation of counsel (p. 1, C. R.) this controls.

This patent, particularly Figure 1 thereof, illustrates spring links depending from the side frame of a truck, "articulated" or pivoted between their ends for transverse swinging, and supporting the ends of a rigid equalizing bar, which are essentially the same as the specific form of spring links

illustrated in Letters Patent No. 627,900 here in suit, with the exception that they are pivotally secured to the side frame and not, as in the Brill patent, mounted in a cup by means of semi-spherical heads. Inasmuch as an inflexible equalizer is supported, and not a flexible one, that is, a semi-elliptic spring, there is obviously no necessity for such mounting, or for a pivot for longitudinal swing. If additional spring motion is desired, complainants' witness Pyott admits that these two methods are "*obvious means*" (x-Q. 158, p. 104, O. R.).

SPENCER & STIDOLPH, No. 2233, MAY 27, 1876.

This patent, as appears at line 9 of the specification, relates to "improvements in bearing springs for carriages, trucks and locomotive engines," &c. It shows a spring link pivotally secured at one end to a semi-elliptic spring, said link passing loosely through an "enlarged opening" in the supporting frame, and having combined therewith "a ring of India rubber or other elastic material." (Specification, line 19). It is stated, beginning at line 26, with respect to the freedom of movement permissible to the link:

"To effect this the spring pin may be left somewhat free in its hole D; the hole E in the supporting bracket may be made conical, or a *spherical surface may be used to effect the same object.*"

The figures of this drawing, when looked at from a slightly different direction, show what is practically the defendant's link and spring construction.

LONGSTRETH, No. 249,962, Nov. 22, 1881.

This patent illustrates spring links which support the ends of semi-elliptic springs. As stated above with reference to the Overbagh links, these

links are "spring" links if the defendant's links are spring links, since they are rigid, non-elastic links spring supported at their upper ends. In this connection, the statement of one of the complainants, John A. Brill, in his catalogue entitled "Parallel in the Development of the Locomotive and the Electric Truck" may be noted.

"There is a remarkable and interesting parallel to be found in the successive steps by which the locomotive and the electric trucks have been developed (page 1).

"The electric truck builders of to-day occupy a place relative to the art similar to the early locomotive builders" (page 2).

HEFFERNAN, No. 412,256, OCTOBER 8, 1889.

In this patent the semi-elliptic springs 15 are spring-supported at their upper ends by means of the links 13 which are spring links, if the defendants are, as they are spring-supported by the semi-elliptic springs 10. Fig. 1 of the drawing shows the combination of a truck frame, the side bar of which is 5, spring links 11 depending from the truck frame, semi-elliptic springs 7 connecting the links, and means for connecting said latter springs with the car body. In this case, the semi-elliptic springs 7 are connected to the car body through the medium of the truck frame. The necessary pivotal motion of the links is also fully provided for by this patent, the specification stating, at lines 48 and 49, page 1, "the connection may be formed in any suitable manner so that the same be pivotal."

The specification also states instructively:

"I have herein shown my invention as applied to locomotives, and have also described the springs as being connected to certain character of frames or trucks; but I would herein state that I do not limit my invention either to a locomotive or to sus-



pending the same from the bars described, as other forms of trucks requiring minor changes in this regard may be used in connection with my invention."

BRILL & CURWEN PATENTS, NOS. 610,118 AND 610,119. AUGUST 30, 1898.

These patents will hereafter be referred to at length, and attention is now called to them only for the purpose of showing that spring links for supporting equalizing bars from the side frames of a truck belong to the prior art.

#### Summary.

The patents above cited are amply sufficient to demonstrate that it was old in car trucks to support semi-elliptic springs, equalizing bars, motors, &c., by means of spring links or spring-suspended links, and they negative any claim of patentable invention arising from the substitution of a spring link or a spring-suspended link in place of the non-elastic link of the Thyng Patent.

If the defendant had a right to substitute in the Thyng bolster-suspended structure the spring link or spring-suspended link of any of the prior patents, Beach, Peckham, Overbagh, or any other, or if the patentee was only entitled to claims limited to his specific form of spring hanger, then the claims being either invalid or not infringed, complainants can hardly feel aggrieved.

#### Authorities on Question of Substitution.

While the law applicable to the subject of substitution is well settled and is well known to this Court, we ask leave to refer to one or more decisions where this question has been judicially determined.

That the transfer of a device from one structure to another (both structures belonging to the

same art) does not amount to invention, where the device performs the same function in both without any change to adapt it for use in the earlier device, and no new or other result except that inherent in the structure following such use.

*Stimpson v. Woodman*, 10 Wall., 117.

In *Office Specialty Mfg. Co. v. Fenton Co.*, 174 U. S., 492, the Supreme Court again restated the rule that a combination of old elements producing only old results and involving no new function is not patentable though the product may be more convenient and salable than anything which preceded it.

In *Covert v. Covert*, 115 F. R., 493, the Circuit Court of Appeals for the Second Circuit laid down the same doctrine. In that case the patentee had taken a construction in wagon jacks found in one patent and changed the method and point of a pivotal connection from a collar sliding on the standard to a positive pivot joint on the base, which latter was found in another patent of the prior art. The Court held that there was no patentable invention in the substitution.

The case of *Carnegie Co. v. Breslin*, 124 F. R., 213, has also recognized the rule. In that case it was held:

"It could hardly involve invention, to carry laterally a feed roller table capable of being lifted only at its inner end and pivoted at its outer end, instead of a table only capable of being raised horizontally. That the pivoted table, whether stationary or carried laterally, is a better contrivance and accomplishes better results in mechanical rolling, cannot alter our judgment in this respect. Both forms of a vertically lifted roller table were in use prior to the patent in suit. One of them had been mounted on a laterally moving carriage, to serve multiple rolls. To substitute the other on the moving

carriage, was clearly not invention within the meaning of the patent law. It merely involved good judgment and ordinary mechanical experience."

In a still later case of *Singer Manufacturing Company v. Cramer*, decided February 1, 1904, the U. S. Supreme Court has said (192 U. S., 265) :

"A vertical cross-brace and a lower cross-brace or tie-rod being common adjuncts of sewing machines at the time of Cramer's alleged invention, and it being also customary to support the lower cross rod or brace in the web of the legs of sewing machines and to utilize the legs as bearings, and it being old in machinery to employ solid castings as bearings or supports for oscillating shafts where a fixed alignment was essential, we readily conclude that there was no merit in mere conception or idea that a vertical double brace was capable of being advantageously utilized as bearings for sewing machine treadles, and that the devising of means for so utilizing such a brace did not involve such an exercise of the inventive faculty as entitled Cramer to assert in himself a right to claim a patent broadly for the use in combination of a vertical double brace and a sewing machine treadle. In view of this and of the fact that the principal elements of the Cramer combination were old, we hold that the Cramer Patent was not a primary one, and that it is not, therefore, entitled to receive the broad construction which has been claimed for it."

#### **Prior Art Presents Question as to Substitution.**

In the present case the transferred spring hanger used by the defendant performs the same functions in the place in which it is used as in its original structure, and that function is an old one and one which is inherent in the hanger itself.

The foregoing presentation of the prior art which

presents the question of substitution is such that this Court, in order to sustain the claims of the Brill Patent No. 627,898, so far as the claims are in controversy, must answer in the negative the following question:

Was it not within the province of the mechanic skilled in the art of truck making, at the date of the alleged invention of the Brill Patent No. 627,898, to substitute for the non-elastic suspending link of Thyng, Romans or Adams the spring suspending link of either Beach, Overbagh, Heffernan, Haskins, Longstreth, Peckham or Brill and Curwen?

If the answer is Yes, the claims in question are invalid.

Non-patentable Invention from the Standpoint of the Brill & Curwen Patents, Nos. 610,118 and 610,119, August 30, 1898, These Patents Belonging to the Prior Art.

These patents are found in defendant's book of patents on pages 311 and 324 T. R.

These patents belong to the prior art irrespective of the question of their filing and issue dates, both of which were earlier than the respective dates of filing and issue of the Brill Patents in suit, and also giving any date to Brill which he may have lawfully proved, because he has solemnly admitted priority by disclaimer, and for the further reason that it appears from the circulars issued by the Brill Company that the trucks of the Brill and Curwen Patents were first placed upon the market, and that the truck of the Brill Patents in suit were referred to and treated as a subsequent invention and improvement. It will be remembered that the disclaimer reads:

"The location of the *semi-elliptic springs* outside of the wheel gauge on each side of the truck, together with the location of the

links for supporting the semi-elliptics closely adjacent to the axle-boxes, and the swinging of said *springs* from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck hansom within the wheel-gauge. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the 3d day of November, 1896, Serial No. 610,902, and therefore I *do not claim the same herein.*"

Both the United States Circuit Court for the District of New Jersey and the appellate tribunals for the Third Circuit and District of Columbia held that these patents belonged to the prior art.

Even if complainant should attempt to escape the force of this positive concession of priority in favor of Brill and Curwen, as bearing upon this suit, he would be unable to do so. Brill's claim as to dates of invention of the patents in suit must in any event rest upon the Mt. Tamalpais truck, or upon the drawing supposedly dated December 30, 1895. Both this truck and the drawing show the spring gearing located outside the wheel frames, and the links suspended adjacent the axle-boxes. Brill disclaims this subject-matter, however, in favor of Brill and Curwen, and accordingly the Brill and Curwen invention must have been made prior to the dates when it was in the possession of Brill. The evidence offered by Brill as to the dates of his invention cannot avail him in carrying his invention back of Brill and Curwen because, if any effect is given to this evidence as carrying back the Brill invention it must be given the same effect in carrying back the Brill and Curwen invention.

This is in accordance with the holding of the Circuit Court of Appeals for the Third Circuit in the

North Jersey case. The quotation is found at page 8 of the opinion (pp. 101-110, D. R.) :

*"It is a solemn concession of priority in favor of Brill and Curwen. The filing and issue of dates of the Brill and Curwen Patent show prima facie their priority over Brill and we find no satisfactory evidence to rebut that prima facie showing, but the admission of the disclaimer settles the question of priority in favor of Brill and Curwen. Patent No. 610,118 to Brill and Curwen must be taken as part of the prior art"* (emphasis ours).

Moreover, complainants' counsel in the North Jersey suit, Mr. Edmund Wetmore, agreed in open Court with this view of the law when he stated :

*"The defendants then come down to the Brill and Curwen Patent which preceded the patent to Mr. Brill, as they claim, and I shall treat it as in the prior state of the art. I agree with Mr. Duell that the disclaimer in the patent puts it in the prior state of the art"* (Rd-Q. 47, p. 68, D. R.).

Then Complainants' expert, Mr. Livermore, in the present case, in answer to x-Q. 23, page 39, complainants' record, although the term "Brill and Curwen" is not used in the question, admits that the truck described "was devised sometime prior to the time of Brill's Patents here sued upon."

Cumulation of law and facts bearing upon the force of a disclaimer is unnecessary. The disclaimer itself is legally binding. Such cumulation of facts is further found, however, in that certain of the Brill and Curwen claims are broader than any of Brill's claims. Brill and Curwen claimed, generically an equalizing bar for connecting the spring links. Brill's claims are, in all instances, limited to the semi-elliptic springs for

connecting his spring links. Such springs are but a specific form of equalizing bar.

Still another fact which points in the same direction is found in the broadly worded specification of the Brill and Curwen Patent. Brill and Curwen set up in their specification a novel structure. They explain in detail the advantages of such novel structure, and particularly as to the functions of the spring links. There is not a word in the specification of either of the Brill Patents in suit which would tend to show that Brill considered his invention a broad one. On the contrary, there is the specific disclaimer.

The broadly worded specification of Brill and Curwen, their broad claims, the evidence offered by complainants, which if it carries invention back to the Mt. Tamplais trucks, also carries the Brill and Curwen invention back to and prior thereto, and the positive disclaimer of Brill in favor of the Brill and Curwen invention, all agree in subordinating the Brill invention to the Brill and Curwen invention. And it is useless for counsel, however desperate their case may be, to argue that the Brill and Curwen Patents are not a part of the prior art in this suit.

#### **Brill Circulars Prove Priority of Brill and Curwen.**

Furthermore, the Brill Company, in presenting the truck of the Brill Patents in suit, which is known as the "Brill No. 27-D," "27-G" or "The Universal Truck," issued to the trade a circular (Brill's Circular 27 D Truck, Defendant's Bound Circulars). In that circular it is admitted that the truck is a modification or combination of elements found in other trucks and especially in the truck of the Brill and Curwen Patent, which is known as the "Perfect Truck, or No. 27." The Brill circular 27-D truck says, referring to the truck:

"It is called the 'Universal' and is a modification of the Perfect, or No. 27, and also

has certain features of the Maximum Traction Truck."

Again:

"We have taken certain valuable features from the Maximum Traction Truck and combined them with others of the Perfect truck, thus obtaining the great convenience of the first with the phenomenally easy riding qualities of the latter."

Still again:

"As in the Perfect truck (the No. 27), the equalizer is made a part of the swing motion, and supports the bolster. The ends of the semi-elliptic spring are therefore carried in the spring-swinging link cases. This not only cushions the swing motion, but it adds another set of springs to those usually employed in the swing motion trucks. These links are hung from the frame by the ball-and-socket joints, which gives great freedom of motion."

It is also shown by Brill 1st and 2d Circulars, 27 Truck, that all the advantages and functions which complainant claims as being novel with the trucks shown in the patents in suit have been set forth by the Brill Company to the trade as being inherent in the structure of the Brill & Curwen truck. Note especially the sixth statement in the column of advantages of the Brill & Curwen truck, on the fourth page of the first circular:

"Perfect equalization of the load on wheels, owing to springs of a draw and recoil character in the swing links, and because of the superior action of the equalizer."

It abundantly appears that the Brill and Curwen truck is a commercially successful and highly practical one. Complainants' witness, W. S. Ad-



ams, states in reference to this truck (p. 230, C. R.):

"x-Q. 293. Is this truck or could this truck be termed a good selling truck?

"A. Yes, a fairly good selling truck; it is a high speed truck. Therefore it is *rather an expensive one*.

"x-Q. 294. How many of these trucks have been sold by the Brill Company, according to the best of your knowledge?

"A. Answering from memory I would say between 2000 and 3000."

And in answer to x-Q. 317, page 234, C. R., the same witness states: "Possibly it exceeds 3000." He also states, when asked in x-Q. 320, page 234, C. R., whether or not it is "a practical and successful truck," "Very much so." Among other "characteristic" features of the trucks of the patents in suit, it is a four-foot short wheel base truck (x-Qs. 7-9 and Answers, page 286, C. R.).

The Brill & Curwen Patent No. 610,118, and its Teaching as to the Question of Non-patentable Substitution.

Figure 1 of this patent shows a combination which includes a bolster (broadly defined in lines 75-87, page 4, as capable of use *without the bolster springs 45 and accordingly comprising but a single element*). Moreover, it shows *spring links* for supporting the ends of the equalizing bars, which are referred to broadly as equalizing bars, thereby showing that the patentees did not consider themselves limited to inflexible equalizing bars, except where it was so specifically stated. The object of the invention is set forth by Brill and Curwen, as follows:

"Our invention relates to improvements in the construction of pivotal car trucks, and especially to that class of pivotal trucks which are adapted for use on passenger cars,

wherein an electric motor or other like agency is employed for the propulsion of the same."

This covers every possible feature or use set up by the complainant in this case. The object is further set forth:

"The primary object of our present invention is to produce an easy-riding truck wherein the movements of the truck caused by unevenness or other derangement of the roadbed, as well as the ordinary evolutions of the truck, are, so far as their effect upon the carbody is concerned, reduced to a minimum, and one of the agencies employed in our present construction whereby this result is achieved to a marked extent is what we term the 'extension' of the bolster spring base."

Further in this specification we find, beginning at line 120, page 3, that the spring support of the truck is defined as consisting of journal box-springs, spiral springs in the spring-links, and semi-elliptic springs in connection with the bolster, and the statement appears at the top of page 4:

"This gives a very great degree of elasticity to the truck and enables it to adjust itself with a minimum amount of disturbance to the inequalities of the track. The equalizers have also the effect of distributing the load equally on the two wheels of each side of the truck *no matter what the vertical position of any of the wheels may be.*"

Here is again a clear anticipation of *any function which depends upon the use of spring links*, whether in connection with flexible or inflexible equalizing bars for distributing the load equally on the various wheels of the truck *no matter what the vertical position of any of the wheels may be.*

We have now shown that the combination set forth in these claims of Brill, in the light of the prior art as disclosed by Thyng, Romans, Adams, Baker, Beach, Overbagh, Longstreth, Haskins, Hefernan and Brill & Curwen, involved merely a selection or aggregation in one structure of old elements all well known in the art, each performing its own function and without any new result or function due to the use of the various elements in one structure. And the law has been stated and restated so many times on this proposition that it need not be stated again. Both the facts and the law are clear.

**Brill & Curwen Patents Demonstrate Invalidity of Claims because Involving Double Patenting.**

While considering this Brill & Curwen Patent, it seems best to view it and its divisional Patent 610,119 from another standpoint. Of themselves they are not only sufficient to negative absolutely any novelty in the claims in question, but are also sufficient to stamp them and all the others in this patent which are similar, as deserving the sharpest condemnation of the Court in that, whether wilfully or otherwise, they involve an attempt to obtain for a patentee in a later patent claims co-extensive with the claims in an earlier patent to himself and another inventor, and the subject-matter of which is fully and clearly disclosed in said earlier patent. This being the case, the claims of the later patent are void *ab initio*, and it requires only a short consideration to show that the facts are as stated above.

As far as *construction* is concerned, the Brill & Curwen patent shows the combination in a car truck, *of the truck-frame, spring links depending from the truck-frame, equalizing bars connecting the links, and means for connecting said equalizing bars with a car-body.* The only difference be-

tween this specific structure and the claims in issue, then, is that the claims recite semi-elliptic springs for connecting the links instead of equalizing bars. These are but variant forms of the same thing.

The equalizing bars in the Brill & Curwen patents are variously referred to as "equalizing bars," "equalizers," and as "straight forged bars carried by spring links or stirrups on their ends from the side bars." In the Patent No. 610,119, moreover, they are referred to as "inflexible equalizing bars," thereby at once bringing to the mind the recognition of what is old in the art and well known to those acquainted therewith, namely, that flexible or inflexible bars had been used interchangeably in a great variety of constructions prior to this time. This may be seen by comparison of the patents which show semi-elliptic springs for elastically supporting the bolster upon the links, as Thyng, Romans, Cooke, Adams, Baker, &c., and the patents to Smith, 40,957, Dec. 15, '63; Gardiner, 98,049, Dec. 21, '69; Block, 416,555; Cooke, 595,045, Dec. 7, '97; English patent to Spencer, and others, which show the inflexible equalizing bar in exactly the same relation.

When spring action is desired, a spring equalizer is used instead of a rigid one. That is all. It is admitted by the testimony of complainants' witness Pyott in the North Jersey case, which appears page 65 of Defendant's Record herein:

"x-Q. 138. And if you wanted to put a heavier load on the truck it would be proper and practical to use a heavier spring?

"A. A spring will carry with perfect safety when compressed to a straight line, even if it is weak, but you have no springing action.

"x-Q. 139. It becomes then practically an unbending rigid bar or beam?

"A. Yes.

"x-Q. 140. And according to your experience an unyielding bar or beam could be used in place of such spring save that it would not be so easy riding? The only difference would be as to the expected loss of elasticity?"

"A. It could be used, but we put a spring in to get elasticity and we want it. We don't put a spring in for a foolish reason.

"x-Q. 141. In case you wanted to use the rigid beam and still wanted an elastic support, how would you get it?"

"A. You would have to add an additional spring in some other part of the truck."

*Comparison Between Claims of Brill & Curwen Patent and Brill Patent.*

Further, in certain of their *claims* Brill and Curwen *limit* the equalizing bar by stating that it is to be an *inflexible* equalizing bar or connection between the links, as in claims 4, 29, 44 and 57. In other claims there is no such limitation relative to the equalizing bar, but an equalizing bar is covered broadly, whether flexible or inflexible. It will be sufficient at this point to note claims 7, 14 and 22. We quote merely claims 14 and 22, which demonstrate our claim of double patenting and no invention.

Claims 14 and 22 read as follows:

"14. The combination in a car-truck, of the side frames having axle-box pedestals, each frame having an upper longitudinal chord, and a lower parallel and swinging member, the lower member being movably suspended from the upper chord, springs included in said suspension, and a bolster supported on said lower member, substantially as described.

"2. In a car-truck, the combination with the side frames having the axle-box pedestals, springs interposed between said pedestals and the axle-boxes, links with interposed springs, said links being supported

from the side-beams adjacent the pedestals, and a *further set of car-upholding springs supported by said link-interposed springs, substantially as described.*"

Both these claims read clearly on the structure of the patents in suit, and eliminate patentability from the claims in issue.

A comparison of claim 13 of the Brill parent patent with the corresponding claim of Brill and Curwen shows that the *only change* in the Brill claim over the Brill and Curwen is in the substitution of the words "semi-elliptic springs" for "equalizing bars." Thus claim 13, which in falling must carry with it every other claim which rests "upon the like combination," involves over the invention of Brill and Curwen the mere substitution of one element for another, which substitution had been recognized as possible and practical "without change of principle" so far back as the patent to Buck in 1871, to be taken up hereinafter. The claims in question are as follows:

#### CLAIM 13, BRILL.

"13. The combination in a car-truck, of the side frames, the *semi-elliptic springs* movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described."

#### CLAIM 12, BRILL & CURWEN.

"12. The combination in a car-truck, of the side frames, the *equalizing-bars* movably and resiliently suspended from the side frames, and a bolster supported on said equalizing-bars, substantially as described."

A comparison of Brill claims Nos. 10, 11, 14 and 80, among others, with claims of Brill and Curwen, 7, 8, 13 and 15, respectively, will show the extent to which identity in language and in substance has been carried. Claims 13 and 81 of the parent pat-

ent are, therefore, void, as involving double patenting.

### Brill & Curwen Anticipate.

Furthermore, the claims in issue of the parent patent in suit are clearly anticipated by the structure of the Brill and Curwen patent, as set forth in drawing, specification and claims, unless it can be held that, after the combination had been disclosed which included the spring-links and an equalizing bar whether flexible or inflexible supported thereby, it then involved invention to use in this combination a specific form of flexible equalizing bar, to wit, semi-elliptic springs. Clearly, however, this could not involve invention because said specific form of flexible equalizing bar was disclosed long before by Thyng, Romans, Baker, Adams and others.

Defendant's expert voices an obvious deduction:

"It is significant to note in this connection moreover, that flexible, and necessarily therefore elastic, equalizing bars are contemplated or suggested in the Brill and Curwen patent. In certain of the claims, see for example claims 3 and 4, the equalizing bars are defined as '*inflexible*.' To specify the equalizing bars as being inflexible, at once suggests that they might be flexible and necessarily, therefore, elastic. The two ideas are inseparable. Inflexible bars cannot be contemplated without at the same time contemplating flexible bars, but, as these bars necessarily carry the entire load of the car body, they cannot be flexible without being, at the same time, elastic" (fol. 77, p. 26, D. R.).

The evidence upon this question of the substitution of a flexible for an inflexible equalizer bar, contained in the patent to Buck, of record, No.

112,897, March 21, 1871, is indisputable. It contains the following:

"My device admits of some modification *without change of principle*; for instance, in applying it to short freight trucks, *rigid equalizer bars may take the place of the spring O P*; such bars having the shackle connection *o p q r* with the springs Q R so as to allow the swing of the bolster upon the shackle connection."

Buck here says that semi-elliptic springs and rigid equalizer bars are equivalents and may be used interchangeably as desired, according to the circumstances. Certainly, if in 1871, the date of the Buck patent, it was considered obvious that rigid equalizer bars could be used instead of semi-elliptic springs, it did not constitute invention at the date of the patents here in question to reform an old structure to the mere extent of substituting flexible equalizer bars, *i. e.* semi-elliptic springs for rigid equalizer bars. But it is not necessary to rely upon the unsupported disclosures of patents. The testimony of complainants' own witness, W. S. Adams, when caught in a trap, is instructive (p. 227, C. R.):

"x-Q. 273. Have you, as an expert mechanic, skilled in the truck art, ever considered rigid equalizer bars and semi-elliptic springs equivalents, in so far as the equalization of the load is concerned? A. As stated above, I consider that it is *probably possible* to make them equivalents, but in view of no truck structure being mentioned, it is impossible to say further."

"x-Q. 274. Have you ever designed a truck in which rigid equalizer bars or semi-elliptic springs could be equally well used to perform the function of equalizing the load? A. *I do not recall doing so.*"

Then letters patent No. 637,544, November 21, 1899, granted to himself (Ans. to x-Q. 279, 228, C. p. 507)



R.), was brought to his attention. Notwithstanding his previous answers, he states (and admits, without explanation or qualification in his answers beginning page 229, C. R.) :

"My invention has relation to the class of truck in which an equalizing bar either in the form of a rigid or inflexible bar or a longitudinally disposed semi-elliptic spring is utilized \* \* \*."

(Specification, lines 14-18, p. 1.)

Referring to the Brill and Curwen patents under discussion and to the Brill parent patent here in suit (specification, lines 25-30, page 1), he states:

"In the constructions which have preceded my invention *which relate more particularly to the construction of the link for the support of the equalizing mechanism, be they either a rigid bar or elliptic springs, \* \* \**"

"Figure 11 is an enlarged side elevation of a portion of the side frame of another form of truck in which my improvements are applied to a *semi-elliptic spring acting as an equalizer; \* \* \**" (lines 9-13, page 2).

Finally, on page 3 of the specification, lines 113-117, he summarizes the solution of the whole question relative to inflexible or flexible equalizing bars (that is, semi-elliptic springs and the substitution of one for the other) :

"I desire it to be understood that where the word '*equalizer*' or *equivalent expression* is employed in the claims, *either the equalizing bars or semi-elliptic springs or other equivalent construction is included therein.*"

It appears, moreover, that the Brill Company paid for the taking out of this patent and manufactures under the same. (Ans. x-Q. 311, p. 293, and Ans. x-Q. 290, p. 290, C. R.)

In the light of testimony as indisputable, further

cumulation is entirely unnecessary. We have the fact.

It accordingly appears that the use by Brill of semi-elliptic springs instead of the equalizing bar of the Brill and Curwen patent, not only did not involve invention, but added absolutely nothing to the disclosure of said patent and any claims of the Brill patent which involve nothing more than the use in a combination, in other respects the same as that of Brill and Curwen, of a semi-elliptic spring as a *flexible* equalizing bar are not only invalid as being fully anticipated, but are *void* in that the said combination is clearly of equal scope with the invention covered by the patent before issued to Brill and another as defined by the specification and claims thereof.

Complainants' expert attempts to avoid the force of the Brill and Curwen patent as anticipatory of the patents in suit on the theory that Brill substituted a semi-elliptic spring for the equalizing bar, spring plank and springs of the Brill and Curwen construction, thereby making one element do the work of three and producing a structure which was patentable over the Brill and Curwen structure. This *theory*, however, is negatived by the *fact* that the Brill and Curwen specification states (lines 75-87, p. 4), that the *spring-plank, bolster-springs and bolster may be omitted, and that "any other means may be employed for tying the equalizing bars together."* (See also x-Q. 285, p. 220, C. R.) The combination would be reduced to the same number of elements as those of the Brill combination in suit, and the only difference then in the Brill construction would be the use of a specific form of equalizing bar, to wit, the semi-elliptic springs,—known substitutes.

**Brill & Curwen Patents Prove Invalidity of Claims of  
Brill Patent, No. 627,898.**

The consideration of the Brill and Curwen patents presents this question, which, when answered in the affirmative, as it must be, will nullify the claims in issue of the Brill patent, No. 627,898.

Are not claims devoid of patentability which involve nothing more than the mere substitution of an old form of flexible equalizer, to wit, a semi-elliptic spring, in place of the inflexible equalizer of Brill and Curwen?

**Other Prior Patents Disclosing the Combination of the  
Claims in Controversy.**

**Haskins, No. 330,023, Nov. 10, 1885.**

Referring more particularly to the construction shown in Fig. 1, this patent shows the combination of *the truck frame* (indicated by the side bars B) *spring links depending from the truck frame, semi-elliptic springs connecting the links, and means for connecting said latter springs with the body of the vehicle.* The construction at one side only of the carriage body in connection with the invention is here illustrated or shown, but it is, of course, understood that there is a similar link for supporting the other end of the semi-elliptic spring F.

The elements are precisely the same as those embodied in claim 13 under discussion with the one exception that the frame is a carriage frame and not a truck frame.

The only possible argument which complainant can advance in avoiding the effect of the Haskins patent as anticipatory of these claims is the fact that the semi-elliptic springs and the spring links for supporting said semi-elliptic springs from the frame, in this patent, are shown in connection with a carriage truck rather than in connection with a

car truck. The question, then, is, so far as this patent is concerned, whether it constitutes invention to use exactly the combination of elements in a car truck which has been before used in a carriage truck. As to the intended scope of the Haskins invention and the manner in which it could be carried out, the Haskins patent reads as follows, on page 1 of the specification, line 17:

"The object of my invention is to provide a novel and efficient spiral spring adapted to be used either separately or in combination with any of the various forms of leaf springs now in use upon wagons *and other vehicles.*"

The term "vehicle" is used throughout the specifications and claims in defining the invention.

It seems scarcely necessary to argue so obvious a point as this, that a certain combination of springs, shown as adapted for supporting a carriage body, is likewise clearly adapted for supporting a car body, save perhaps that its members would need to be somewhat strengthened. The passage which has been quoted from the specification, however, shows clearly that the patentee Haskins considered that his invention was adapted to a variety of vehicles and for a variety of uses, and as such clearly could be used upon car trucks. As to this point, the language of defendant's expert, Mr. Freeman, a man of high standing in his profession, is clear and without ambiguity, and his reasons for his opinion seem unanswerable. He states his opinion (p. 31, D. R.), as follows:

"The fact that the Haskins construction is illustrated in connection with a wagon or carriage, is rather in its favor than otherwise as a disclosure of means for effectively overcoming or reducing the shock or jar or jerk which is liable to be transmitted from the running gear to the vehicle body, in that a wagon or other vehicle running on common

roads are subjected to greater vertical and lateral movements owing to the unevenness of the roadway than are vehicles running on the specially and carefully prepared tracks of a railway.

"I am clearly of the opinion that the Haskins construction constitutes a substantial embodiment and anticipation of the subject matter of the claims in question, notwithstanding the fact that, as specifically illustrated in the drawings of the Haskins Patent, the semi-elliptic springs are not shown as arranged in pairs and connected near the ends of a transverse bolster of the vehicle as is apparently contemplated in Claim 81 of the first patent in suit. The semi-elliptic springs of the Haskins Patent obviously act as equalizers; they carry the body of the vehicle and they are connected to and suspended from the side frames of the running gear by a movable and elastic connection and, specifically, by links combined with springs. The construction and operative relation of the connections between the vehicle and the running gear are the same in substance and effect as the corresponding parts of the construction disclosed and claimed in the patent in suit. Clearly it is a mere matter of choice or selection on the part of a mechanic skilled in the art to apply the Haskins construction to any particular form of vehicle running gear."

Unless the Haskins Patent belongs to a different and non-analogous art from that of car-trucks, it clearly invalidates the claims in controversy. Defendant's witness, Mr. Sanders, who was an examiner in the Patent Office and had charge of car trucks for nine years, states the practice in Division 34, which has charge of car trucks, with reference to the analogy between the carriage and truck art. He testifies, in answer to Q. 12, page 82, D. R.:

"A. The class of railway rolling stock and the class of carriages and wagons were al-

ways considered while I was in the Patent Office as analogous arts, and it was common practice, when a pertinent reference was found in the class of carriages and wagons, to cite the same against the claim for an improvement in car truck."

Testimony on this point, however, seems to be unnecessary, for, as this Court well knows, it is utterly immaterial what sort of a body—a car or carriage—rests on a given running gear.

Jones *vs.* Cyphers, 126 F. R., 755.

Briggs *vs.* Duell, 93 F. R., 753.

Penn. R. R. Co. *vs.* Locomotive Trust Co., 110 U. S., 490.

*Brill's Attorney's Recognition of the Pertinence of the Haskins Patent as a Reference.*

The patentee's attorney recognized the propriety of rejecting claims in this application upon reference to the Haskins Patent, for the file wrapper and contents show that the Examiner rejected three claims solely on Haskins, and that two of these were cancelled by the amendment of April 20, 1898. (Defendant's Exhibit, File Wrapper and Contents Brill Parent Patent).

These claims read as follows:

"5. In a car truck, the combination with car pivoting devices, said devices comprising spring links, and semi-elliptic springs supported by said links, substantially as described.

"8. In a car truck, the combination with the truck frame, of a bolster, resilient suspending links, and semi-elliptic springs connecting the links, and supporting the bolster, substantially as described." (File wrapper.)

When Claim 8 is analyzed, it will be seen that it embodies the following elements:

- (1) A truck frame;
- (2) Resilient suspending links;

- (3) Semi-elliptic springs connecting the links;
- (4) Means (a bolster) for connecting the semi-elliptic springs with the car body.

Claim eight, cancelled upon Haskins, is indistinguishable in matter of substance from claims 13 and 81 of the parent patent in suit.

*Brill Estopped from Claiming Patentability Over Haskins Patent.*

We submit that the patentee cannot now be allowed to insist that there is patentability in the combination of the claims in controversy, in view of his admission, made by the cancellation of Claim 8, that such combination of elements was disclosed and therefore anticipated by the Haskins Patent. It is unnecessary to burden the Court with citation of law in support of a proposition so obvious.

*Questions Presented by Haskins Patent.*

The Haskins Patent presents, among others, these questions, the correct answer to either of which renders void the claims in suit of the Brill Patent No. 627,898.

Does not Haskins disclose side frames, semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster or equivalent connecting means connected to said springs?

Has not Haskins the right to use his combination of semi-elliptic springs and movable and resilient spring links, as shown in Fig. 6 of his Patent No. 330,223, in a car truck, he having stated that it was adapted to be used "upon wagons and other vehicles"?

In considering the latter question, the attention of the Court is called to the following Circuit Court of Appeals cases:

Briggs v. Duell, 93 F. R., 972.

Jones v. Cyphers, 126 F. R., 753.

The latter case was founded on a patent for improvements in incubators or brooders, and it dealt with the problem of ventilating an incubator. Two earlier patents dealt with the problem of ventilating a house or room, and the objection was made that a house was not an incubator. The Court said:

"We are clearly of the opinion that the devising of systems of ventilation belongs to a single art, whether such systems are to be applied to a hospital, a sewer, a ship's hold, a cold storage box, an incubator, or any other structure where circulation of air is sought to be secured."

In the case of *Briggs v. Duell*, Commissioner of Patents, the Court held that there was no invention in merely applying and adapting to the planing and grooving of cakes of ice mechanism previously in the planing of wood.

#### BLOCK PATENT No. 416,555.

As showing the way in which this art has been developed and what inventors in the art not only thought but actually did, at a time long prior to the date of the patents in suit, the disclosure of the Patent in Block, No. 416,555, is not only persuasive but convincing. He states that he has invented "certain new and useful improvements in running gear for car trucks and *other vehicles*." Further:

"My invention relates to all classes of vehicles which are subject to longitudinal and lateral shocks, and which are designed for such uses as to render it desirable to ease up these shocks as much as possible. Such vehicles are generally provided with some form of spring to take up vertical jars or jolts and the object of my invention is to devise a simple means to convert all horizontal movement of the body of the vehicle upon the running gear into a vertical movement



thereon, in order that both the weight of the body with its load and also the vertical spring may be made to offer a yielding resistance to these horizontal movements."

Eight of the figures show his invention as applied to a *car truck*, while Figs. 9, 10 and 16 show the same invention as applied to *carriages*. After setting forth the general nature of his invention, which is a device for neutralizing shock, he says:

"In the remaining figures of the drawings I have shown how this rocker may be applied to *various forms of car trucks and carriages*.

Fig. 6 represents a six-wheel passenger truck with certain portions broken away, and shows two ways in which my device may be applied thereto. Figs. 11 and 12 are side and end views, respectively, of a four-wheel passenger truck containing the same device. Figs. 7, 13 and 15 are side views of freight trucks embodying my invention. Figs. 8 and 14 are end views of the trucks shown in Figs. 7 and 13, and Figs. 9, 10 and 16 illustrate the application of the rocker to a carriage.

In Fig. 6, at the left hand, the rocker A, is placed between the beam B, which supports the car and the plank C, resting upon the hanger D. At the right hand of the same figure the rocker is applied to the hanger D itself, and an additional rocker A<sup>1</sup> employed at the other end of the hanger. In Figs. 11 and 12 these two forms are combined, the bar C being extended to rest upon the rockers A<sup>1</sup>, attached to the universal hangers D.

Convenient ways of applying this rocker to freight trucks are clearly illustrated in Figs. 7, 8, 13, 14 and 15.

In *carriages and other light vehicles*, the rocker may be interposed between the different portions of the springs, as in Figs. 9, 10 and 16, the ends of the same being broadened, as shown in Fig. 10, to furnish a bearing for the rocker in the case of a longitudinal shock."

Here is a clear showing of a device of the same character as Haskins' link, shown and described as applicable at will to a carriage or a car truck.

Moreover the patent to Spencer & Stidolph relates to "bearing springs for *carriages, trucks and locomotive engines*, for railway, trainway and common roads" (specification).

BOUGHTON No. 472,724, APRIL 12, 1892.

The specification of this patent states as follows:

"This invention relates to connections or couplings for vehicle-springs, and aims to replace the connections generally employed for connecting the *ends of springs with bolsters or with the side bars, be the latter rigid or spring, and for connecting the ends of springs with any portion of the vehicle-body or running gears*, whereby a universal hanger or connection is had to permit the body to swing in all directions to adapt itself to the direction of strain or jolt."

Here is stated in clear terms the applicability of this invention to various kinds of vehicles, and the invention comprises, as will be seen upon inspection of Fig. 1, the spring-supported links E, the semi-elliptic springs C connecting said links, and means for connecting said semi-elliptic springs with the carriage body.

It is submitted that this patent negatives the claim that any of the claims in controversy are patentable, and certainly so when taken in connection with the patent to Block and the recognized adaptability of carriage springs for use in car truck structures.

*Patentee Brill Further Admits Pertinency of Haskins, Boughton, and Others.*

The pertinency of the Boughton patent, as anticipatory of the claims of Brill patent 627,900 and

of the parent patent 627,898, is very clearly shown upon an inspection of the patent to G. M. Brill, 627,899, called the Brill Intermediate Patent. This is another specific patent divided out of the subject-matter of the Patent 627,898, in the same manner as the patent in suit 627,900, was divided therefrom. It shows as a specific means of accomplishing the results called for by both the patents in suit, a form of link suspension which is practically identical in every detail with that of Boughton. If, then, the result which it is desired to accomplish by the structure of the two patents in suit can be accomplished by a structure identical with that of Boughton, certainly no claim in either of the patents in suit can be sustained over Boughton, save such as are limited to a structure specifically different.

If Brill, instead of inserting his broad claims in the Patent 627,898, had put them in the Patent 627,899 and in connection with the specific structure there disclosed, as he had a right to do, even complainants' counsel would not have the hardihood to argue that Boughton is not a pertinent reference.

#### **Further Bearing of Brill File-Wrapper and Contents of Patent No. 627,898.**

The file-wrapper and contents of this patent was not before the Court in the North Jersey case. That it is relevant and material has previously been indicated; and the testimony of defendant's witness, Louis M. Sanders, in connection therewith, is a commentary upon the pertinacity and importunity with which Brill's attorneys prosecuted the case. Mr. Sanders testifies that he examined the applications for the two Brill Patents in suit (Ans. to Qs. 2 and 3, p. 74, D. R.; also Ans. to Q. 4, p. 75) and states that initials "L. M. S." appearing at the close of each office letter are his initials and

that the letters were written under his dictation although signed by the principal examiner. He also states that during the first four years of his incumbency, he kept a record of his own actions taken in the various applications which he handled, and that the average number of these actions "was over one thousand per year" (Ans. to Q. 8, p. 78, D. R.).

It is not then surprising that the Beach and Overbagh Patents referred to, and the Buck and Davenport & Bridges Patents, hereinafter to be discussed, were not cited as references while the patents in suit were pending. (Defendant's Exhibit, File Wrapper and Contents of Brill Parent Patent.)

He further states, and this is completely borne out by the file-wrapper and contents in evidence, that he repeatedly rejected the claims in controversy upon the Thyng and Haskins Patents and never receded from his position (A. to Q. 10, p. 79, D. R.).

The testimony of Mr. Sanders with respect to the manner in which the claims in question finally came to be allowed, is decidedly interesting. It comprises the latter part of the answer to Q. 10, p. 80, D. R.:

"Subsequent to this office action the applicant's solicitor, Mr. Joseph L. Levy, came to me in an interview for the purpose of securing a withdrawal of this rejection, and presented oral arguments as to why he thought the rejection to be improper. Inasmuch as I considered at that time the application of the references to be correct, I refused to give my personal consent to the withdrawal of the action, and, upon his persistence, I suggested that if Mr. Simpson, who was in charge of the division, consented to the withdrawal I would have nothing further to say. The matter was presented to Mr. Simpson and after considerable argument pro and con, Mr. Levy requested

Mr. Simpson to *allow the claims and to let him take his chances in the Courts to sustain them*. Finally Mr. Simpson acquiesced in this treatment of the case and I had nothing further to say. A reference to this conversation is made on page 106 of the file wrapper where a request is made for a reconsideration of a large number of claims rejected on the Thyng and Haskins Patent, *in view of a recent interview*. It will be noted that no subsequent reference is found in this file wrapper to either the Thyng or the Haskins Patent."

**Complainants' Combination of Admittedly Old Elements Is Devoid of Patentable Novelty.**

Brill went into the field of the prior art and by the exercise of ordinary judgment, without any mechanical skill, substituted for the links of the Thyng truck spring links which were old as shown by Haskins and other patents of the prior art. He even did less, for he admits in the specification of one of the patents in suit that he was not the first to use such spring links, arranged in the same way, but that if there was any invention in that it was that of Curwen and himself as joint inventors.

Complainants' attempts to set forth a new function for the combination of old elements disclosed by the patents in suit are not only contradicted by the facts, but even taking it as it reads, falls far short of satisfying the rule that the burden of proof is on the complainant to show that a combination of old and well-known elements produces a new and better result than that produced by prior combinations.

In *Fairbanks Co. v. Stickney Co.*, 115 F. R., 720, the Court, speaking of a patent for a new combination of old elements, said:

"It is not necessary, in order to defeat a patent of this kind, as I understand the law, that it should be shown, as it would have to

be for a patent for a device that was claimed to be entirely new—a new invention—that it had been preceded by some machine that was exactly or substantially like it in all respects, and anticipated in that way. It is not necessary that this should be shown in the case of a patent for a combination of old devices, where it is admitted that the devices are old, as there is no invention in merely assembling the different old elements. But, in order to sustain such a patent, it must appear that there was invention in so putting them together that it produced a new result—a new and valuable result—and not merely the old result in substantially the old way. There is no invention merely in the change in the form of uniting the constituent elements, or in the manner of assembling them together, to form the machine, if the result is the same as in prior machines.”

“‘Something more is required to support a patent than a slight advance over what has preceded it, or mere superiority in workmanship or finish’” (*National Tooth Crown Co. v. MacDonald*, 117 F. R., 617-619).

The authorities on the presence or absence of patentable invention in a structure, wherein all the elements are old, and the law applicable thereto, are instructively set forth by the Circuit Court of Appeals for the Sixth Circuit in the recent case of *Goodyear, &c., Co. v. Rubber, &c., Co.*, 116 F. R., 363.

The truck art was fully developed at the time when Brill claims to have made the truck of his patents in suit, and, even if he were the first to think that the Thyng truck would be easier riding if the links were spring supported, there was no invention in the means he used for carrying out his thought, as spring supported links were old—in car trucks (see patents to Beach, Overbagh, Spencer and Stidolph, Longstreth, Heffernan, &c.) ; in car-

riage running gear (see patents to Haskins, Boughton, &c.) ; and in the kindred art of motor suspension (see patents to Peckham, &c.). A patent must rest upon the novelty of the means used to carry out an idea, and there was no novelty in Brill's means from any standpoint.

It is not only proved but also admitted by complainants' expert, that each and every element of the claims of the patents in suit are old in the car-truck art. Each of these elements operates in the same way in the truck of the patents in suit, as it did in the old trucks, and produces the same result. There is no patentable invention in such selection and putting together such old elements.

"There is no invention in merely selecting and putting together the more desirable parts of different machines in the same art, where each operates in the same way in the new machine as it did in the old, and effects the same result. No principle of the patent law stands on plainer reasons than this" (Overweight Counterbalance El. Co. v. Henry Vogt Mach. Co., 102 F. R., 957-961, Circuit Court of Appeals).

Furthermore, the thought was not Brill's, but was Brill's and Curwen's, and expressly disclaimed by him in their favor. But whether Brill's or Brill's and Curwen's is of little moment, for the thought not being patentable any one had the legal right to take the Thyng truck and introduce a spring in the link suspension thereof, or to mount the link so that it should be free to move both transversely and longitudinally, as had been done so many times in connection with links of the same character.

There was no new conception in accordance with which the Brill truck was built, there were no novel elements used in building that truck, there was no novel assemblage or arrangement of ele-

ments, and there was no new result attained by the truck as built.

Furthermore, the Overbagh Patent shows that equalizer bars had been suspended from the side frames of trucks by hangers or bolts passing through the side frames and spring supported thereon; and the Beach Patent shows the spring-suspended link which defendant uses supporting a bolster.

The Buck Patent, and the Davenport & Bridges Patent, hereinafter discussed, show all the elements combined in one.

While Brill may be entitled to specific claims among the hundred and thirty odd claims in the patents for what he did, those claims are not alleged to be infringed. It would be monstrous and entirely beyond the purpose of the patent laws, which are to encourage invention, if one could pervert the purposes of those laws and stifle all improvements by means of broad generic claims on spring suspensions in such an art as this. With confidence we submit that this Court will not permit this to be done.

#### **Patentability of Claims of Patent No. 627,900.**

Without seeking to narrow or place any construction upon the claims in controversy of this patent apart from what they would bear upon their face, even if the patent were not a divisional one and the claims thereof necessarily directed to and construed in the light of the specie of the case, the prior art discloses the non-patentable character thereof. The Court will have perceived by this time, independently of the "admissions" under that heading, that just as Claim 81 of the Parent Patent falls with Claim 13, so all the claims of the second patent must stand or fall together.

Claim 13 includes a "double bolt" construction of the links, the universal pivot joint connection



between the links and the truck frame, and "further springs included in the link suspension." To this extent it describes more specifically the Brill construction than does the 13th Claim of the Parent Patent.

Disregarding for the moment the question of infringement, based upon the necessary limitation of the claims of this patent to the *specie* of the case, and accepting Claim 13 as broadly as it reads, we find the same lack of patentable invention which characterizes the two claims of the Parent Patent. The specific form of link shown appears in the U. S. Patent to Cooke, No. 595,045, December 7, 1897, the filing date of which is prior to the filing date of the Brill Secondary Patent, which, in accordance with stipulation of counsel, as previously stated, controls (p. 1, C. R.). Fig. 6 of the patent to Haskins, No. 330,023, likewise discloses a link consisting of two members jointed together and including a spiral spring. Defendant's expert, Mr. Freeman, discusses the relation between these two links and the Brill link construction at pages 38-40 of Defendant's Record, and it is not believed necessary to add anything further thereto. It may, however, be noted that the links shown in the Buck, Davenport & Bridges, Overbagh and Beach Patents are such that the description of the links contained in Claim 13 of the Second Patent reads directly upon them, if it reads upon the defendant's construction.

Claim 14 "differs from Claim 13 in that it defines the links as comprising 'a plurality of sections pivotally secured together' instead of 'bolts pivoted between their ends'" (page 40, D. R.). It accordingly appears that Claim 14 is broader in terms than Claim 13 and is met by the same constructions which meet the latter.

Claim 15 differs from Claim 14 only in the fact that "further springs" are defined as spiral springs

and as arranged about the links (p. 41, ~~D. R.~~). As indicated in connection with Claims 13 and 14, the specific feature of spiral springs combined with links is so old and has been disclosed to the Court in so many structures that it is unnecessary to recapitulate. Like Claims 13 and 14, Claim 15 is also void for lack of patentable invention.

Claim 17 is more specific than the other claims in that it describes more particularly the manner in which the links are connected to the truck frame and states that semi-elliptic springs are supported upon the lower articulation of the links (p. 41, D. R.). It is less limited than the others mentioned, in that it does not include the resilient feature of the links. This claim not only lacks patentable novelty over the various patents mentioned but, also, is substantially met by the patent to Thyng, the only difference being the manner of suspending the links. This method, however, is shown at Fig. 4 of the Patent to Peckham, No. 563,685, wherein a spherical surface is seated in a corresponding recess, the links passing downwardly through the enlarged opening in the member containing the recess. The Patents to Beach, and to Boughton, and the English Patent to Spencer & Stidolph likewise show this form of suspension, the latter patent particularly stating "the hole E in the supporting bracket may be made conical, or spherical surfaces may be used to effect the same object." And complainants' witness Price, when asked with respect to the Overbagh hanger, how he would provide for the universal swing from the top connection, states as a matter of course that he would "make the holes" \* \* \* "large enough" \* \* \* (Ans. x-Q. 79, p. 150, C. R.). (Heretofore quoted.)

It is so obvious that the claims of the second patent when construed broadly enough to include the defendant's construction, must fall with the

claims of the first patent because they lack patentable invention over the prior art, that it has not been deemed necessary nor desirable to burden the Court with a more extended discussion. Defendant's expert, Mr. Freeman, discusses the question involved and succinctly states his reasons for coming to the conclusion at which he arrives, on pages 37-42 of Defendant's Record. Patentable invention is undeniably lacking in these claims if lacking in the claims of the Parent Patent in view of the character of the prior art as outlined.

**Claims 13 and 31 of Brill Patent No. 627,898, and  
Claims 13 and 14 of Brill Patent No. 627,900  
Unequivocally Anticipated.**

In the light of the foregoing which indicates the wealth of the prior art from which Brill drew for the combinations set forth in the claims above named, this Court will not be surprised to discover that the question involved in this case is not merely one of patentable invention. Notwithstanding the fact that no previous requirements had existed in electric railway practice for trucks of the character of those about which the halo of "type" has been attempted to be cast, we find that the precise combination of these claims were "stolen by the ancients." A glance at two patents of the prior art, Davenport & Bridges, and Buck, will disclose the fact that claims as broadly drawn as those in question cannot be held to be other than flatly anticipated. We will first turn to the Davenport & Bridges Patent.

**DAVENPORT & BRIDGES PATENT NO. 183 OF 1850.**

This patent was not before the Court in the North Jersey case (page 70, D. R.).

The invention is stated to relate to a "new and useful improvement in railroad carriages." The Court's attention is especially called to the truck

structure illustrated in Figs. 2 and 3 as being most pertinent at the present time (see p. 389, T. R., for large view). This truck shows a bolster in the form of a plank Q upon which the car body is supported through the intervening standards X X and Z, which carry a second upper cross plank Y, upon which the car body rests. At the ends of the plank or bolster Q are cross-bars R R to which are secured plates S, these plates being suspended from the transverse beams N O, by means of universal suspension links which are supported at their upper ends by semi-elliptic springs W W resting upon the transverse beams. The plates S, which support the ends of the bolster, and to which the suspension links are connected, are described in the specification in the following language:

“Metallic *springs* or plates S S are bolted to the underside of the bars R R” (second column, p. 1, 17th line from bottom).

And further in the 6th line of the paragraph, beginning at the middle of the first column of page 2, the construction is thus described:

“The connection of these *springs* with the lower *springs* or plates S S, etc.” (Italics are ours.)

It thus appears obvious that these patentees intended as bolster supporting elements interposed between the bolster and the suspension links the use of springs or plates and used the word “springs” as applied thereto in the same sentence and of the same scope as they had used said term in describing common semi-elliptic springs W W by which the suspension links are supported. This Davenport & Bridges Patent accordingly *shows* the combination of a bolster, plates supporting said bolster and universal spring links suspending said plates from the truck frame, and *describes and discloses* the combination of a bolster, springs supporting the

ends of said bolster and universal spring links depending from the truck frame and supporting the ends of said bolster supporting springs. That is the gist of the claims in question.

Even complainants' expert, Mr. Livermore (middle page 108, **Complainants' Record**), admits that "*this construction affords the swinging or flexible connection*" (of the Brill construction) "*between the car body and bolster and the truck frame \* \* \**" He contents himself with the specious objection that it does not afford *as much* "breadth of spring base and stability" as does the Brill construction. It will be observed that the latter issue is not raised by the specification or the claims in controversy, and, if it were, it is settled by the disclaimer of the Brill Patent. The gist and the substance of the alleged invention is again disclosed.

The Davenport & Bridges bolster-supporting devices are supported from the side frames indirectly. If the claims in question are to be construed as if they defined the suspension from the side frames as being a "direct" one, then, of course, they would be to this extent mechanically distinguished from the structure of Davenport & Bridges. In view of the disclaimer, however, it is not apparent how any argument can be made upon this point.

The specification of this patent contains much additional internal evidence pertinent to the subject-matter here in question, as in the various statements throughout the specification, and particularly in the paragraph beginning near the top of the first column of page 3, as to the possibility of using or omitting springs at various points in the structure where such omission might be found advisable.

When complainants' witness Adams comes to consider the Davenport & Bridges Patent, he asserts that the plates S S are not springs. We have never contended that they were. The specification of that patent, however, distinctly refers to "*metallic springs or plates.*" This statement is in the dis-

junctive. See line 6, page 2 of the specification, which says, "The connection of these *springs* with the lower *springs* or plates S S." The drawing shows plates, but the specification clearly indicates that springs may be used in place of the plates. It was old at that date to suspend semi elliptic springs in a similar relation (see Thyng patent) as that shown by Davenport & Bridges, and it was unnecessary for them to show both plates and springs. This Davenport & Bridges Patent shows conclusively that neither Brill nor Brill and Curwen were anything save borrowers from the prior steam propelled car truck art.

It is accordingly clear that the combination set forth in Claims 13 and 81 of Patent No. 627,898 and Claims 13 and 14 of Patent No. 627,900 is fully anticipated in this patent; in fact these claims can be read directly upon the Davenport & Bridges structure, and Davenport & Bridges would have had the right to make such claims in their application, had they so desired, at the time when such application was pending.

BUCK PATENT NO. 112,897, MARCH 21, 1871.

This patent discloses in a car truck—

- (1) A truck frame;
- (2) Spring links depending from the truck frame;
- (3) Semi-elliptic springs connecting the links;
- (4) Means (a bolster) for connecting the semi-elliptic springs with the car body.

It discloses each and every of the elements found in Claim 13 and it only differs from the Claim 81 in that the spring links depend from one of the cross bars of the frame and not directly but indirectly from the side frames. The location of the suspension point has however been disclaimed.

Specifically considered, it discloses a well-known form of truck frame having the upper and lower side bars, end bars, pedestals, transoms and intermediate cross ties connecting the side bars and a bolster between the transoms, which is supported

upon longitudinal semi-elliptic springs, the ends of which are connected by a universal joint device in the shape of two clips or shackles at right angles to each other, to transverse semi-elliptic springs which are in turn supported from one of the cross ties of the truck frame. The construction of the truck is such that the bolster is supported by semi-elliptic springs, the ends of the semi-elliptic springs being supported by appliances which permit free motion for the bolster both longitudinally and transversely of the truck, and so adjusted as to provide relatively to the truck frame a vertical spring movement.

The nature and object of the invention are thus stated in the second and third paragraphs of the first column of the specification:

"My invention consists in the firm attachment, beneath the ends of the bolster, of springs extending across at right angles with the bolster, and whose ends are connected by shackles to the ends of springs suspended from the intermediate cross-ties of the truck.

"The object is to give an easy and durable *combined spring and swing-motion*, and to *bring the bearing directly over the springs of the equalizer bar*, so that there shall be no tendency to warp or strain the frame of the truck."

In the general description the specification says that N is the bolster, O P are half elliptical springs, firmly and rigidly attached at their mid-lengths to the lower side of the bolster, near the end of the latter. The spring links are made up of the semi-elliptic springs, Q R, at the ends of which are two sets of links, *o p* and *q r*, which connects the two sets of semi-elliptic springs. The specification further says:

"*The bolster has constant and free capacity for spring-motion on the shackle connections of the springs and spring-motion on the spring O P, and equalizer springs G.*"

In other words, we find disclosed in this patent once more what is, if anything, the gist of the Brill invention and intended for the same object, which is to give an easy and durable *combined spring and swing motion*, so that there shall be no tendency to warp or strain the frame of the truck.

*Certain Minor Considerations Relative to Buck.*

It may be urged on behalf of the complainants that this is not a practical form of truck for use in electric service, for the reason that there is not space left to hang the motors or for inside brakes. Given this truck, with a statement that it was desired to hang the motors within the wheel base and to use inside brakes, no mechanic of ordinary intelligence would have any difficulty in adapting the truck for motors and inside brakes. As a matter of fact it is not essential that there should be inside brakes or that the motors should be hung within the wheel base, for it appears that both companies litigant hang the motor *outside* the wheel base (Ans. x-Q. 77, p. 57, C. R.).

An effort may also be made on the part of complainants to make capital out of the somewhat ambiguous statement in the second column, second paragraph, page 1 of the specification of the Buck Patent:

"I *prefer* to make the springs Q R of sufficient power to hold up their ends on *ordinary occasions* in contact with the lower side of the intermediate cross-tie; but having sufficient flexibility to be brought into use as springs and in *extraordinary occasions*."

He who runs may read the answer, however, for it is only necessary to refer to the first few words to observe that it is a *preference* and not a requisite. Neither can the feature of short wheel-base, or any other objection with reference to the truck-frame be relied upon in view of the state of the art, of the fact that the same are not placed in issue by the



claims, and of the fact that Taylor, among others, in his Patent No. 507,855 shows and describes a short wheel-base, pivotal truck adapted for two motors to the truck, and designed for use on electric railways. Any objection on the ground that the semi-elliptic springs would have to be shortened to obtain a short wheel-base, or "breadth of spring base," or semi-elliptics situated outside the wheel-gauge must also fall to the ground. Complainants' witness, Pyott, testifies x-Q. 145 to x-Q. 150, page 103, C. R., that semi-elliptic springs may be efficiently used even though less than twenty inches in length, and it is clear that such length would be shorter than any required for any length of wheel-base in the market.

Complainants have offered in evidence a drawing marked "Complainants' Exhibit, Enlarged Buck Patent Drawing," and a truck model alleged to be made in accordance therewith. While it does not require an expert to point out the obvious discrepancy which exists between the disclosure of the Buck Patent and the embodiment thereof in complainants' exhibit above noted, the testimony of complainants' witness Sommer, draftsman in charge, with reference to the character of the semi-elliptic springs located longitudinal of the truck, is interesting. These springs are disclosed in the side elevation of Complainants' Exhibit, Enlarged Buck Patent Drawing (p. 425, C. R.).

"Q. 9. From what did you make this last-mentioned side elevation?

"A. I made it from the other two views *out of my head.*"

That is precisely where complainants' views with reference to the Buck construction have apparently come—out of their heads. A comparison of the Buck Patent with the model which defendant has put in evidence entitled "Defendant's Exhibit, Model Buck Truck" will show the Court the obvious correctness thereof.

If there is anything patentable in the Brill structure over the Buck Patent, it does not lie in the features broadly claimed in the claims in controversy. Were there nothing else before the Court than the Buck Patent, it is submitted that the two claims of Patent No. 627,898 must fall, as well as Claims 13 and 14 of Patent No. 627,900. What we have said of the Thyng and Beach trucks applies to the Buck truck. It would be immaterial even if the truck as an entirety were inoperative. It discloses the combination of the claims and is not inoperative as to the claimed structure.

**Question for Consideration Growing Out of Buck, and Davenport & Bridges Patents.**

In view of the foregoing, it is believed that the Court will find an anticipation of Claims 13 and 81 of the Parent Brill Patent and Claims 13 and 14 of the Secondary Brill Patent. Both admittedly disclose the the "combined swing and spring universal movement" which it is alleged characterizes the Brill construction and which constitutes, if anything does, the "gist of the invention." Both of these patents disclose the combinations of the four claims under discussion. Although in both cases, as previously stated, the suspension is indirectly from the side frames, that is from the transoms, this and the location of the spring system outside the wheel gauge is expressly disclaimed by Brill. The claims read directly upon both constructions and are anticipated thereby.

The question accordingly arises whether, irrespective of patentable invention over the prior art, the claims in question are not so broad as to be unequivocally anticipated.

**The Defendant's Structure and Its Alleged Infringement of the Claims in Controversy of Patent No. 627,898.**

The defendant's structure is a short-wheel base pivotal truck intended to be propelled by electricity,

and in these respects is the same as the short-wheel base pivotal truck of the Taylor Patent No. 507,855 of the prior art. Into this old type of truck the defendant has incorporated the combination for supporting the car body of the Thyng Patent independent of the truck frame; *i. e.*, a bolster supported at its ends upon semi-elliptic springs, the ends of which are supported by hangers connected with the side frames of the truck. In place of the Thyng hangers it has employed an old form of spring-supported rigid hangers, such, for example, as shown in the Beach Patent or the Overbagh Patent.

It did what it had a right to do, and if any claim in suit be construed broadly enough to cover what the defendant did, then such claim is void.

The question of infringement depends entirely upon the point whether the rigid link or hanger spring supported upon the frame of the truck used by the defendant is the same as the spring hanger or link of the patent. Everything else is old both singly and in entirety. The complainants must take one horn of the dilemma. If the hangers or links used by the defendant are the same as complainants' and therefore infringement follows, then they are clearly anticipated. By proving infringement the complainants prove invalidity. To the defendant it is immaterial which horn of the dilemma the complainants take.

#### Patent Office Recognition of Differences between the Hangers or Links.

The Patent Office recognized the difference between the two hangers by allowing notwithstanding the Brill-Uebelacker interference, claims in the Uebelacker Patent which belongs to the Peckham Co., the real defendant, for the form of defendant's hangers in combination with the side frame, bolster and semi elliptic springs. This is shown by a reading of the claims of Uebelacker Patent, as for example Claim 7 of Uebelacker Patent No. 635,986.

"7. In a car truck, the combination with side frames having pedestals and beams connecting them, of a bolster, springs 29 supporting the bolster, suspending appliances for said springs supported from said beams and extending from a distance above the beams to springs 29 below the beams."

Brill also has claims (not in suit) embracing the truck frames, bolster and semi-elliptic springs in combination with his specific forms of hangers. If the claims in controversy are to be broadly construed as to embrace any form of spring hanger or spring suspended hanger, then such claims are invalid.

#### **Radical Differences between the Two Links or Hangers.**

The Court's attention is also especially directed, as bearing upon the question of infringement, to the radical points of difference between the two structures here in controversy. The complainants' link embodies, as best shown in Figs. 1 and 2 of Patent No. 627,898, a strap or hanger 36, which supports the end of the semi-elliptic spring. This "strap or hanger," as it is termed in the specification, the same term being used in the claims to define the same element of the combination, encloses and rests upon a spiral spring 34. This spring again is carried by cup 33, which is carried at the lower end of a bolt 28, having a semi-spherical head 29 seated in a semi-spherical recess 30 in the side bar (see lines 57 to 102, p. 2 of the Specification).

The defendant's construction is radically different. It comprises, as may be best seen in the Exhibit "Model Defendant's Truck," a single bolt or link carrying at its lower end an ordinary coupling which supports an end of the semi-elliptic spring, the upper end of the link passing through the side frame and being supported at some distance thereabove by a heavy and comparatively inelastic spring

buffer. It is substantially the link of the Beach or Overbagh patents.

Complainants' construction comprises in its main features a rectangular strap or loop, a long and comparatively elastic spiral spring enclosed within said loop, a bolt for supporting said spring and a ball and socket joint between the bolt and the side frame.

Giving the elements the same names in so far as possible, in order that there may be no question of playing with words, the defendant's construction comprises a spring coupling, a bolt connected to said coupling, and a heavy spiral spring or buffer between the upper end of said bolt and the side frame.

Brill desired to provide a spring link or a spring hanger, or a resilient connection between the semi-elliptic spring and the side frame, let the terms be what they may, and he interposed a light spiral spring which encircles the supporting bolt and is interposed between said bolt and his "strap or hanger." Defendant does not desire any such spring and does not use one. And we find complainants' own witness, Harrington, stating, in answer to direct-question 18, page 114, C. R.:

"If anything, the *Peckham* was the easier riding truck, in that the more crosswise motion was permissible in the *Peckham* 14 B-3 truck."

Brill supports his link on the side frame by a ball and socket joint. Accordingly he is supposed to get a rolling contact between the link and the side frame and does not need the buffer. Defendant does not use a ball and socket or any device for giving a rolling contact, but uses a metal side frame and a metal bolt, and accordingly it puts a heavy spiral spring between the end of the bolt and the side frame at the point where there would be contact of the two if no buffer were present. While this buffer may have a slight spring action, it has not such a spring action as should justify this Court

under these circumstances in holding that it embodied the combination of semi-elliptic springs and co-acting spring links claimed by Brill, no matter how broadly Brill's claims may be interpreted. So far as Brill is concerned, his spring and the spring action thereof is made an essential and necessary part of his combination. So far as the Peckham truck is concerned, the spring action of the buffers, in so far as it has any effect upon the semi-elliptic springs or co-operation therewith or relation thereto, is practically negligible.

The flat semi-elliptics have practically no longitudinal play (Ans. Q. 48, p. 258, C. R.; also see "Photograph of Defendant's Car," p. 290, C. R.). The Peckham truck does not show a spring co-acting, in any sense worthy to be considered by this Court, with the semi-elliptic springs. It does have and it must have a buffer to cushion the metal to metal contact of the suspending link and side frame. Otherwise the metal would crystalize and break (Complainants' witness Livermore, Ans. x-Q. 30, p. 40, C. R.). No mechanic at all conversant with the truck art or with the principles of structures involving metallic parts would attempt to build a truck like the defendant's without interposing a buffer at the point where the Peckham truck interposes it. So far as a spring *in the link* is concerned, however, that involves a mere matter of degree as to ease of riding of the truck. Such spring might be desired by some designers, considered useless or disadvantageous by others, and could be supplied with equal facility at any of the various different points in the truck.

The construction of the defendant's truck is so radically different from that of the Brill patent that if the spring buffers of the defendant's truck were removed there could be no possible claim of infringement. Can the complainants then monopolize the use of buffers in such relation, and can the defendant be prevented from adopting such an old and universal mechanical expedient as the placing of a

cushion or buffer between two contacting metallic parts, one of which is capable of movement with relation to the other?

It is an obvious fact, and admitted by the complainant's expert, that such buffers are the same as the buffers used in connection with similar links in a similar relation, and embodied in a truck structure by Mr. Peckham, president of the Peckham Manufacturing Co., long prior to any date which it has even been attempted to urge for the patents in suit (see Patent to Edgar Peckham, No. 464,253, noting especially the cushioned link best shown in Fig. 3, and the description thereof on p. 2 of the specification, lines 30 to 39):

"To the lower ends of the two bolts, *j j*, at opposite sides of the truck, are pivotally connected two parallel cross-bars *F F*, and to said cross-bars, at a point about midway between the bolts *j j* is secured the motor support *I I*. In order to allow this support to rock laterally I make the *i* sufficiently larger than the bolt to allow the latter to move laterally and interpose between the offset *P''* and washers *o o* soft rubber cushions *t t \* \* \**."

Herein we have the cushioned link *J* used for supporting each end of the motor equalizing bars *F*. The defendant company not only had in its structures this cushioned link, but they had used them for supporting the ends of equalizing bars. Surely the transition from motor equalizing bars to bolster equalizing bars was one well within the skill of the ordinary mechanic. In this connection the Court's attention is also called to the motor supporting link shown in the Peckham patent No. 424,723. This link *n*, shown in side elevation in Fig. 1 and in top plan in Fig. 2, is in this instance provided with a ball at its upper end which seats in a socket in the extension of the frame *R*<sup>1</sup>. In this case there was a rolling contact between the two parts and no buffer was needed, as already explained. If the Peckham Manufacturing Company, the real defend-

ant herein, can be prevented from using its motor supporting link for supporting the end of a semi-elliptic spring, then the long established rule which has again and again been stated by this Court that a patentee is entitled to all the uses of his invention in whatsoever relation such uses may be desired must be abrogated.

#### WHAT A PATENTEE HAS THE RIGHT TO CLAIM IN A FULLY DEVELOPED ART.

We submit that the differences which exist between the complainants' and defendant's constructions, both in spirit and in substance, and in results, are vital and must be considered in view of the narrow construction which must be given these claims in order to save them, if indeed the words "substantially as described" appearing at the end of the claims can do this. Irrespective of the question of patentability, in view of the state of the prior art, it is not possible for this Court to find infringement.

"If the Court below were justified in placing upon the first claim of the patent in suit the broad construction which it did, and which we have just been considering, the device of the defendant below clearly infringed the same, since it exhibits the very feature of the combination set forth in the first claim of the patent in suit, upon which, thus broadly construed, invention is predicated, to wit, the lateral movement of a pivoted feed roller table—discarding here for the moment any consideration of the question as to whether defendant's table is pivoted at the outer end, within the meaning of the first claim. Dissenting, however, as we do, from this broad construction of the patent in suit, and for the reasons above stated, we are compelled to consider the question of infringement, in view of a narrower scope to be given to the claim in question. The combination described in that claim, and as explained in the specifications to which it refers, if a patentable



invention at all, is a specific unitary organization, to which the particular means described for laterally moving feed roller tables, pivoted at their outer end, and actuated synchronously on both sides of the rolls by power transmitted through or from the rolls themselves, is necessary. In other words, we do not think that the first claim covers all means and devices for laterally shifting the carriage and tilting the feed roller frame at its inner end. Limited as above stated, appellant's structure does not infringe the specific organization covered by the first claim of the patent in suit. The words, 'substantially as set forth,' with which the claim concludes, cannot here be ignored, and the language of the Supreme Court is in this case especially applicable:

"Where the claim immediately follows the description of the invention, it may be construed in connection with the explanation contained in the specification; and where it contains words referring back to the specification, it cannot properly be construed in any other way."

*Carnegie Co. v. Breslin*, 124 F. R., 213-220.

The same doctrine is followed by the Supreme Court in the very recent case of *Singer Manufacturing Co. vs Cramer*, also cited above, wherein the Court says, referring to Claim 1, which ends with the words "substantially as specified":

"To prevent a broadening of the scope of the invention beyond its fair import, in the light of the circumstances surrounding the issuance of the patent, the words of limitation contained in the claim must be given due effect, and, giving them such effect, the statement in the first claim of the elements entering into the combination must be construed to refer to elements in combination having substantially the form and constructed substantially as described in the specification and shown in the drawings."

In *Sanders v. Rose*, 121 F. R., 835-840, the Circuit Court of Appeals for the Eighth Circuit held that,

"When two inventors have each adopted the substantial features or elements of an earlier invention, making respectively but slight changes in or improvements upon the earlier device, each will be limited to his own specific form of device; and, if there are differences therein, neither device will be held to be an infringement of the other. In all such cases the general words of a claim, especially where the claim contains words of reference to a more particular description of the thing patented, which is contained in the specification, will be held to cover only the structure or the device so particularly described."

In view of the previous extended discussion of the matter here in question, so disproportionate to the simple character of the issue, the Court's attention is with diffidence called further in the *Carnegie v. Breslin* case. Such extended discussion is forced upon us by the character of the arguments which are advanced in support of the broad construction which complainants seek to give these patents. The subject-matter involved in the *Carnegie v. Breslin* case relates to machines for handling and rolling iron, especially structural forms. The proper and economical handling of such large masses of metal is a matter of great importance, both from the standpoint of time and material and from the standpoint of safety and prevention of injury to workmen. It was shown that the patent in suit, from the commercial standpoint, had made a very substantial advance in the art, and that the alleged invention was commercially important and almost indispensable. No direct anticipation of the claim in question was shown by the prior art. However, notwithstanding the commercial status of the invention and the importance of the art, this Court held that the alleged invention involved nothing more than the substitution, in a certain combination of elements which

had been shown as embodying a vertically lifted rolled frame, of another old type of movable roller frame, to wit, one pivoted at or near one of the ends thereof. The Court held that broadly there was no invention in such substitution, that the words "substantially as set forth," with which the claim ended, could not be disregarded in construing said claim, and that a difference in the structure of defendant-appellant, which amounted to nothing more than a different positioning of the pivotal point of the roller frame, was such a difference as to avoid infringement of the claim when properly construed.

It would be impossible to set forth the law relating to a state of facts such as we have in this case with more force and cogency to sustain our contention than the language of the Court in this Carnegie case.

It is submitted, however, that this Carnegie case is not by any means "on all fours" with the present case. In the Carnegie case the character of the patented device, the character of the prior art and the importance of the results accomplished by the patented device were all much more favorable to the contention of the validity of the claim than in the present case. The Carnegie case involved the commercial and successful handling of heavy masses of structural iron. The present case involves the presence or absence of a spring in a certain part of a truck structure, springs having been used or omitted in at least half a dozen different parts of truck structures. The invention in the Carnegie case was shown to be commercially important apart from the business energy and skill of its promoters. The present invention has not been shown to have any commercial importance whatsoever apart from the great selling facilities of the J. G. Brill Company. In the Carnegie case there was no direct anticipation of the claim in question. In the present case both Buck and Davenport & Bridges, and Haskins, show direct and absolute anticipations of the claims in question. The invention in the Car-

negie case involved the substitution of one class of lifting device with power supplying mechanism therefor, for another class of lifting device adapted to act upon very heavy masses of metal, under such circumstances that the proper supply of power and economical handling of the work was of prime importance and presented problems by no means simple. This case involves at the best the mere substitution of a yielding or elastic hanger for an unyielding hanger, the function and character of yielding hangers and unyielding hangers having been alike well understood in the art and the function and character of springs used as elements of a supporting device being familiar to any school boy who has reached the age of ten years, and up to that time has displayed even moderate ability in acquiring a part of the common knowledge of mankind.

This Court cannot hold that the mere presence or absence of a spring in the Brill truck involved invention, or that infringement may be present or absent in the defendant's construction by reason of the mere presence or absence of a buffer spring, without overturning entirely the doctrines of this Court, and holding that a patentee may by virtue of the patent laws abstract and withhold from the common use of mankind that which is and has been, since the memory of man runneth not to the contrary, a part of common public knowledge.

#### **The Defendant's Alleged Infringement of the Claims in Controversy of Patent No. 627,900.**

The only difference in construction between the truck set forth in this patent and that set forth in the patent already considered is that instead of a single link, there are two links, pivotally secured together with the spiral spring on the lower of said links, as already pointed out. It is stated in the patent, page 2, line 52, and on, that this articulation between the links is for the purpose of allowing transverse swing of the lower section of the link

*without inclining it in relation to the upper link section*, such action being illustrated in Fig. 3. That is, that the link is intended to swing as a whole from its ball and socket mounting. It is also again stated (as in the paragraph beginning line 74, p. 2), that the articulation of the link allows of a bodily transverse swing of the lower portion of the link perpendicularly (to a certain extent) to the side bar. This last statement is very ambiguous, and it is impossible to say whether it is simply a repetition of the description of the action of Fig 3, or whether is thereby intended to mean the pivotal motion of the spring-carrying link which may be caused by a slight motion of the bolster, and which motion is not sufficient to affect the upper part of the link.

It is axiomatic that a divisional patent which defines more specifically the construction of elements broadly set forth in a parent patent can only claim these elements specifically. The complainants, moreover, are estopped from seeking any broad interpretation of the claims in question, since, as is shown in the Defendant's Exhibit, "Copies of Letters in the File Wrapper of Patent No. 627,900," the Examiner, during the prosecution of the case, objected to Claims Nos. 15 and 16, of the application (see office letter of December 7, 1897), on the ground that they were not specific enough in view of the parent application. Thereupon applicant amended these claims so that they read as they now read in Claims 13, 14 and 15 of the patent, and urged that they should be allowed on the ground "*that they are now drawn to cover specie of this case as per amendment of December 9, 1897*" (p. 97, D. R.). Upon this representation that his claims were drawn to cover the *specie* of the case, the claims were allowed. Moreover, Brill's attorney verbally so stated for like purpose (Ans. Q. 11, p. 84, D. R.).

The claims of this patent are also very sharply limited by the fact that Claims 83 and 84 of the parent patent 627,898 specify "*jointed links.*" In view of these claims in the parent patent and the

fact that the claims of the divisional patent must be construed as *more specific* than any claims in said parent patent, the claims of the divisional patent can be sustained as patentable in any regard over the claims in the parent patent only by construing *most rigidly* the language thereof which refers to the "bolts pivoted between their ends," as in Claim 13—or the links "flexibly supported," as in Claim 17. Defendant's trucks do not have bolts pivoted between their ends. They have a single link or bolt, and a very old form of coupling for connecting the end of said bolt directly to the semi-elliptic spring. This coupling is only necessary, in any event, because the semi-elliptic springs are in a horizontal plane, while the link is a vertical rod, and, therefore, a single pin cannot be used to provide a pivotal connection between the two. It is accordingly necessary to provide a coupling which shall have a bearing for one pin with which the semi-elliptic engages, and for another pin with which the link engages, these pins being at right angles to each other. This is exactly the construction shown in Fig. 6 of Haskins, and such coupling is so well known and its use so obvious, that it was not considered necessary to refer to it in the Haskins' specification. Defendant can no more be said to have a plurality of bolts or a plurality of links than can the construction shown in the patent to Peckham, No. 464,253. There is in that patent, as shown in Fig. 3, a single link or bolt, and inasmuch as the cross-bar F lies in a vertical plane, a single pin provides the necessary pivotal connection. If it were desired to have the cross-bar horizontal, any mechanic would have substituted, as a matter of course, a coupling exactly like that shown in connection with defendant's links, or exactly like that shown by Haskins, in order to provide for pivotal movement between the link and the part carried thereby, and this would not have involved and does not involve in the case of defendant's structure, a plurality of links or a plurality of bolts.

Another important fact of difference to be noted between defendant's construction and the specific construction called for in Claims 14 and 15 of this patent, is that each of these claims describes the cross-bolster as "suspended below the side frame." The specification states that an advantage and a purpose accrue to this arrangement (lines 65-8, 74-7, 94-8, p. 1):

"The bolster consists of a cross-bar 12, extending transversely of the truck and lying under the side bars 5, and an inverted arch bar 13 \* \* \* the end of the cross-bar carrying an upwardly-extending bifurcated yoke 18, forming a support for the side bearings of the truck, \* \* \* the superposed yoke 18, embracing the side bar 5 *to limit the swing of the bolster and to form, with the side bar, guides for the up-and-down movement of the bolster.*"

In other words, all the bolster elements are inter-related and interdependent upon each other for the accomplishment of a purpose which defendant attains, insofar as attainment is desirable, by a different construction and method. As will be clearly seen from an inspection of defendant's truck, the ends of the bolster are seated upon chairs which are in turn secured to the semi-elliptic springs. By the latter mode of construction, the abnormal transverse or sidewise movement of the bolster is limited by reason of the fact that the ends strike against the side frame of the truck or upon cushioning means secured thereto. The Brill construction, however, requires that special yokes 18 should be secured to the bolster and embrace the side frames in order to limit the bolster swing; otherwise the top of the bolster will jam under the side frames. In the light of this clear divergence from the matter set forth in Claims 14 and 15, and from the object set forth in this patent, as well as in view of the fact that the patent under discussion is necessarily limited to the *specie* of the case, the above

differences are material and characteristic, and infringement cannot be predicated.

In the light of the facts recapitulated above, defendant has not infringed these claims, even if said claims are valid when specifically construed. Defendant's links do not comprise "bolts pivoted between their ends," but comprise exactly what is shown by Haskins, to wit, an upper link and a lower coupling, which could not by any interpretation be called a bolt, which coupling is pivoted to the link and supports the end of the semi-elliptic spring. The differences in phraseology between the claims of this patent have been already discussed under the heading, "Patentability of Claims of Patent No. 627,900." Further comment would be mere surplusage.

That the question of infringement as to these claims is a most pertinent one in view of the radical differences between the defendant's structure and the structure of the patent is clear from the statement in the specification, page 1, lines 25 to 27:

"My present improvements relate to the construction of the links for supporting the semi-elliptic springs from the truck-frame."

And further, lines 45 to 50:

"The truck and its associated parts, with the exception of the links, as hereinafter described and claimed, form no part of my present invention \* \* \*."

These statements follow an acknowledgment of the prior application upon which Patent No. 627,898 was issued. It is thus clear that this patent is at the best limited to a specific improvement in link construction and that, in such patent, claims which call for "links comprising bolts pivoted between their ends" and links "flexibly supported" upon the side frame must be interpreted in accordance with their plain meaning. Under such circumstances a claim cannot be made "a nose of wax."



### General Considerations Founded upon the State of the Art and Various Structures before the Court.

This case has thus far been presented from the standpoint of the dominating considerations, in order that the Court might have clearly before it the facts upon which alone a decision of the issues should be predicated. Should the Court desire to carry the investigation further, however, we will now consider certain other minor considerations.

#### CERTAIN MINOR CONSIDERATIONS:

##### Pyott Tests of Thyng Truck.

In the previous litigation precisely these same tests were involved (x-Q. 59, p. 69, C. R.), and complainants' counsel has attempted and will here attempt to show thereby and by the Complainants' Exhibits "Pyott Photograph No. 1" and "Pyott Photograph No. 2," that the semi-elliptic springs in the Thyng truck would settle under the initial weight of the car body and that after a load had been placed upon the car the links would be so strained, owing to their having *moved longitudinally*, that there could be no further movement of these links, or, at least, not sufficient to properly provide for a further lengthening of the semi-elliptics under shocks and jars when the trucks were in operation. The theory would seem to be, that the links would be strained in taking up the bolster slack between the transoms longitudinally of the car in the starting and stopping thereof, as well as by the lengthening of the semi-elliptics, although complainants' own witness, Price, in answer to x-Q. 90, p. 152, C. R., states that it only takes the force or friction produced by a man's "right arm" to "entirely prevent" all lateral swaying of the bolster in city and interurban double trucks, indicating what is obviously the fact, that bolsters are constructed to fit the transoms as closely as possible, only allowing a clearance sufficient to permit up and down motion. "In addition to serving as a connec-

tion between the opposite side frames of the truck they form as is usual with this type of truck, a guide or housing for the bolster" (Defendant's Expert Freeman, fol. 41, p. 14, Defendant's record). Moreover, it is noticeable that complainants' witness Pyott himself admits that the Thyng truck is a practical one for steam railways up to a speed of from twelve to twenty miles an hour (p. 105, C. R.).

"x-Q. 167. Is the Thyng truck adapted for use on steam railways where the speed is from twelve to twenty miles an hour?

"A. I consider it a practical truck in train service, at the time of its invention, but not when you convert it into an electric locomotive of the present date."

The method pursued by complainants was to say the least peculiar. These tests were made several years ago (Ans. to Q. 7, p. 63, C. R.), no invitation having been sent to defendant's counsel to be present, nor were they given knowledge that such tests were to be conducted. No electric motor was placed upon the trucks and, although there was and is an abundance of trackage at the Brill works, some "two miles," of which "1,000 feet or more" is continuous (Ans. to x-Qs. 46 and 47, p. 54, C. R.), the trucks were not operated (Q. 20, p. 65, C. R.). Complainants have produced a photograph of the Thyng truck with an empty car body thereon. They *neglected* to make a photograph of the truck when the car body was loaded, although the alleged strain on the shackles was first noticed "*at the extreme low depression*" of the semi-elliptics (Ans. to x-Q. 131, p. 101, C. R.). No reason is adduced why such photograph could not have been taken at the same time the others were, and none exists.

It is submitted that the only evidence which can be considered on this point is that which was developed in the actual construction of the truck, as per the testimony of the witness Pyott, and in so much of the tests as have been properly brought before the Court by photographs of the truck during such

tests. Any testimony of the complainants' witnesses as to what *might happen under certain conditions, not present*,—and most of the testimony, including five or six drawings by complainants' witness Adams is of such a character—or “*judging from the photograph*,” is utterly valueless and incomplete. Disregarding for the moment the question whether or not the Thyng truck was properly built, it would have been a very simple matter to determine by actual tests what would have happened to the Thyng truck under such conditions, which was entirely within complainants' power. As has been stated, Pyott admits that the truck was good enough for steam railroading when the cars were run at the rate of from 12 to 20 miles an hour. Moreover, he even testifies that such defects as, in his opinion, result from the construction of the truck were defects the remedy of which was obvious to him (p. 104, C. R.).

“ x-Q. 158. You stated in the North Jersey case that pivoting in two directions or providing a ball or radial seated bearing indicated in your report, would be obvious means of remedying these defects. Do you still agree with this testimony?

“ A. I do.”

Coming now to the construction of these trucks by the witness, it appears that the shackles were made “rigid on a longitudinal line” (Ans. to Q. 15, p. 64, C. R.), although it is obviously the fact, and the witness admits it (Answer to x-Q. 62, p. 70, C. R.), that the shackles in the drawing of the Thyng Patent are shown with a clear space along the line of the pivot-pin between the cheeks of the upper half of the shackle and the bolt pivoted therebetween, clearly indicating, as indeed the patent itself must have to the witness, since he admits that the alleged defects could be obviously remedied, that a looseness of pivoting was intended to take up such little end play or extension as the semi-elliptics might have. When Pyott admits that the Thyng truck is

good for from 12 to 20 miles an hour, he *ipso facto* admits that the Thyng links were intended to, and do have longitudinal motion. He also admits (Answer to x-Q. 74, p. 71, C. R.), as does also complainants' witness Harrington (Ans. to x-Q. 62, p. 123, C. R.), that if the parts of the links were constructed more loosely "it would admit of a freer action." Moreover, it is noticeable that the Brills provided a spring "*made to order especially for this truck*" (Ans. to x-Q. 137, p. 102, C. R.), having a *three and a half inch set* or normal curvature (Ans. to Q. 38, p. 67, C. R.), although the springs as put out by the Brill Company show an actual set of *two and five-eighths inches* (Ans. to x-Q. 113, p. 98, C. R.). Pyott admits that the spring used does not even conform to the patent drawing (x-Q. 99, p. 96, C. R.). Moreover, Brill's semi-elliptics have six, seven, eight and nine leaves (Ans. x-Q. 336, p. 236, C. R.). In this connection it is noticeable that the Patent to Thyng shows a very flat elliptic; that in the English practice flat elliptics are used (Ans. to x-Q. 65, p. 70, C. R.); that the defendant's trucks use this same type of flat elliptics (Ans. Rd-Q. 44, p. 65, D. R., and Ans. Q. 48, p. 258, C. R.); that such springs carry perfectly even when compressed to a straight line (x-Q. 163 and Ans., p. 105, C. R.), and that the type of spring last mentioned has only a slight end play or extension (Ans. to x-Q. 68, p. 70, C. R.). This testimony is decidedly illuminating in respect to the obvious motive and objects of the complainants in making these tests and is not made less so by the negative admission, or affirmative denial, as the case may be, notwithstanding the positive admission above noted, of the witness Pyott that his construction of the Thyng trucks does not even correctly represent the Thyng drawing (beginning p. 96, C. R.):

"x-Q. 104. Inasmuch as you have testified in answer to x-Q. 102, that you were 'controlled by the drawing in combination with' your 'own knowledge,' and testified in the last

answer that there is a necessity for such a provision, and testified in answer to x-Q. 74, that if the parts of the links were constructed more loosely 'it would admit of a freer action,' and in answer to x-Q. 62, that, referring to the space along the line of the pivot pins, between shackle cheeks or links 'there is apparently a slight clearance there, according to the blue print,' why didn't you, in the first place, make the shackle, as shown in the blue print in question ('Complainants' Exhibit Thyng Enlarged Drawing'); or, in the next place, make other provision for a longitudinal flattening or extension of the semi-elliptics?

"A. In the drawing both pins or pivots in the links or cheek plates run in a longitudinal direction, which shows they are only to provide for a transverse movement of the bolster.

\* \* \* \* \*

"x-Q. 106. You stated that you were 'employing your own knowledge'; then, why didn't you employ it, and make the change which you say was necessary, as well incidentally as making the shackles more loosely pivoted, as shown in the blue print 'Complainants' Exhibit Thyng Enlarged Drawing'?

"A. I stated that I was controlled by the drawing, my mechanical knowledge only serving to interpret the same.

\* \* \* \* \*

"x-Q. 108. Then you admit that you did not build the shackles with a clearance along the line of the pivot pins, between the sides of the shackle and the links pivoted there between, although 'Complainants' Exhibit Thyng Enlarged Drawing' shows such a clearance, and although in answer to x-Q. 74, you stated that if the parts of the links were constructed more loosely 'it would admit of a freer action' (referring to the semi-elliptic), do you admit this?

"A. *I do not admit this.*

"x-Q. 109. Aren't you rather partisan?

"A. There are two links or cheek plates; the yielding action of the spring would have given a sheering process to these plates be more mechanically defective than when held

in close relation. They would tend to sheer off the pin or bolt through the links.

“x-Q. 110. Couldn't you use stronger pins?

“A. Yes.”

If the pins would tend to “sheer off,” so would the defendant's, which pass through the eyes at the top of the hangers (if indeed the defendant's links have longitudinal motion within the purview of this alleged invention), and no one has ever urged that defect. In both cases the pins would be subject to a cushioned “sheering” action.

In addition to the foregoing it appears that five and one-half inch shackles were first put in the truck (Ans. to Q. 27, p. 65, C. R.) and that then they hung vertically when attached to the spring (Q. 48, p. 68, C. R.). Thereafter these shackles were shortened one and three-fourths inches (Ans. Q. 27, p. 65, C. R.) *without changing the point of suspension* of these shackles (Ans. to x-Q. 84-5, p. 72, C. R.), and the semi-elliptics extended one inch (Ans. x-Q. 88, p. 72, C. R.) so that each end was stretched *longitudinally half an inch* when the car body was jacked up one and three-fourths inches, and then it was “a simple matter” to connect the ends of the shackles to the extended spring *by hand* (Rd-Q. 189, p. 440, C. R.). The testimony of the witness as a whole is rather mixed, but that cited is to the point. Such a test was merely an attempted “frame-up” which went wrong.

In view of the foregoing, it is respectfully submitted that the alleged tests of the Thyng truck are absolutely worthless for any purpose. Briefly, specially selected parts provided by the Brill Company, which did not even conform to their own practice, went to make up the Thyng truck; this construction did not correctly represent the Thyng Patent in even one important particular; and absolutely no test was made in operation nor is a photograph of the Thyng truck at the time the alleged defects were noticed, before the Court.

By this test-truck, complainants have endeavored to show that the truck shown in the Thyng Patent is an inoperative one because if motors were used upon it the shocks and jars incident upon use "as an electric locomotive" would bend or break the spring suspension. As to this question of motor-propelled truck or truck propelled by an outside force; that is, for instance, as to the motor car or the trailer, it is submitted that it is nothing less than an absurdity to ask the Court to say that the question of patentability or non-patentability, anticipation or non-anticipation of a combination which covers various springs and elements for supporting a car body on a truck, which combination involves no element whatever of or relating to the motor support, can in any way be affected by a question as to whether an anticipating patent is or is not shown as a motor car. Complainants are practically asking the Court to say that if a train carries two cars, each equipped with identical trucks, one used as a motor car and the other as a trailer behind the motor car, that the one set of trucks under the motor car are infringing complainants' patents while the other and identical set of trucks under the trailer are not infringing said patents; because, if the claims of this patent should be sustained on the ground that they had "special relation to improvements in car trucks designed for the purpose of carrying a motor for electric propulsion or the like," then certainly, as applied to car trucks which did not carry a motor, these claims would be of no value. The ambiguity here is only apparent, however. Complainants' *patents* have special relation to motor trucks because they show, describe and claim (Claim 76) appliances *specially designed to support a motor* thereon. So far, however, as the *claims* are concerned which specify simply features of the car body support, they apply to any truck whether a motor truck or not and they are likewise anticipated by any truck, if the substance thereof is sufficient, whether it is a motor truck or not.

Moreover, the operativeness or non-operativeness of either the Thyng truck or the Beach truck as an entirety has nothing whatever to do with the use of the Thyng spring system or of the substitution thereinto of the Beach hanger, both of which are clearly operative. The claims in controversy do not call for longitudinal and transverse movement of the bolster, but, even if they did, the Thyng truck has such movement and, as Pyott admits, is an operative truck up "to twenty miles an hour;" and the Beach hanger has universal movement if the defendant's hanger has, since they are the same.

The law applicable to the question of the pertinency of the Thyng Patent, or of the Haskins Patent, or others, is firmly settled. It is reviewed in *Miller Co. v. Meriden Bronze Co.*, 80 F. R., 523. At page 525 the Court says:

"But I do not understand that the law necessarily imposes upon a defendant, who relies upon the prior art to limit the scope of a patent, the burden of proving that prior patents were useful, operative or commercially successful, or that they stated all the undeveloped possibilities of the invention therein disclosed. It is not necessary that the patentee should have conceived the idea of all the uses of which his invention is capable. He is entitled to all the beneficial uses embraced within the scope of his invention. *Manufacturing Co. v. Cary*, 147 U. S., 635, 13 Sup. Ct., 472; *Dixon-Woods Co. v. Pfeifer*, 5 C. C. A., 148, 55 Fed., 390; *Manufacturing Co. v. Robertson*, 23 C. C. A., 601, 77 Fed., 985. Nor is the mere fact that a patented device is limited in operation or application alone sufficient to destroy its relevancy in a consideration of the prior art." \* \* \* "It is well settled that mere paper patents may negative patentable novelty, provided they sufficiently disclose the principles of the alleged invention, or provided the alleged objections could be obviated by mere mechanical skill. *Pickering v. McCullough*, 104 U. S., 310."



The Supreme Court in *Aron v. Manhattan Ry. Co.*, 132 U. S., 84, concurred with the views of Judge Wallace, who heard the case below, and held that to modify certain old devices used to close blinds and transoms so as to make them capable of closing railway car gates would not support a patent. What was there said fits the present case.

"The patentee is entitled to the merit of being the first to conceive of the convenience and utility of a gate opening and closing mechanism which could be operated efficiently by an attendant in the new situation. His right to a patent, however, must rest upon the novelty of the means he contrives to carry his idea into practical application. It rarely happens that old instrumentalities are so perfectly adapted for a use for which they were not originally intended as not to require any alteration or modification. If these changes involve only the exercise of ordinary mechanical skill, they do not sanction the patent; and in most of the adjudged cases, where it has been held that the application of old devices to a new use was not patentable there were changes of form, proportion or organization of this character which were necessary to accommodate them to the new occasion. The present case falls within this category."

Any defect in the Thyng truck, or any strengthening of the springs or other parts to enable it to be used as a motor truck is admittedly "obviated by mere mechanical skill."

#### **No New Result from the Use of a Spring in Connection with the Hanger.**

The use of the spring in connection with the hanger may make an easier riding truck than where the spring is not used. For the sake of the argument we may admit that it does, but if it does, it is only a difference in degree, and no new result is accomplished. Had no one ever used a spring

hanger, it would not amount to patentable invention to add the spring to the old hanger for the purpose of making an easier riding truck, so well known is the use of springs for such purposes. (Ans. x-Q. 74, p. 57, C. R.) We have shown, however, that spring hangers and spring suspended hangers were old in trucks.

The patentee's alleged double swing and spring motion of the bolster was not new, and it is not due to the use of the spring in connection with the hanger. Complainants' own witness, Akarman, admits that it dates at least back to the days of single trucks in 1889 (x-Qs. 73, 74, 75, and Ans., pp. 85-6, C. R.). It exists when that spring is eliminated for the "vertical spring motion" is imparted to the bolster by means of the semi-elliptic springs 21, and the "double swing motion" is imparted to the bolster through the use of the semi-spherical head 29 of the hanger 28 seated in the recess 30 in the side bar 5.

We have shown that the alleged invention does not reside in the "double swing and spring motion," in the "low-hung short-wheel base," in the "pivotal" feature, nor in the "interior carried motors," for such features are *not only old, but they are not elements of the claims and some of them are not even referred to in the specification of the patents.*

Attention has already been called to the Taylor Patent No. 507,855. The specification of that patent at line 82, page 1, refers to a prior patent to the same inventor, No. 455,990, July 14, 1891. The specification of that patent at line 41, page 2, says:

"The particular features of this truck are the transverse and longitudinal motions permitted the bolster without interfering with the movements of the truck frame, the arrangement of spring whereby the bolster and frame are amply cushioned and yet an open centre left between the wheels, so that elec-

tric motors can be conveniently attached to the truck; also the wheels can be set close together and the body of car is lowered, reducing the height of car steps."

"Though the invention has not been actually anticipated, its novelty may be destroyed, owing to the general state of knowledge at the time when the application was made for the patent. It may be impossible to point to any specific thing or to any particular publication which disclosed the subject-matter of the patent, and yet the information at the disposal of the world at large may be such that obviously the patentee has produced nothing new."

Edmund, Pat. (2d Ed., 1897), p. 650.

If complainants' truck is a "rapid running" truck, that is due to the motors and not to the spring used with the hanger. At this point, moreover, the requisites for high speed as stated by complainants' witness Harrington, <sup>Ex. B.</sup> p. 123, C. R., may be noted.

"x-Q. 61. Please state whether excellence of roadbed, motive power and strength of equipment are the chief requisites for high-speed electric travel?"

"A. Yes, and in addition thereto heavy rails, trucks having a long-wheel base for high speed electric travel. I understand your question particularly applies to inter-urban high speed service."

Complainants may lay stress on a supposed new result in the patents in suit on the ground of non-tilting or kicking up under brake pressure. That may be to an extent true. There is the same difficulty here, however, that there is with all the arguments as to a new result which have been advanced in support of these patents. It has not been shown, and it cannot be shown, that any such results, whether old or new, flow from anything covered by the claims in question. There is a fatal

variance between the alleged result and the invention claimed. The Court will find on page 5 of the Brill circular, "No. 27-D Truck," the following statements relating to the advantages of this truck, which is the truck of the patent in suit:

"The brake apparatus calls for special attention on account of the important improvements which we have made. The violent 'kicking up' under the action of the brake, so characteristic of the ordinary equalized swing beam brake, we have entirely obviated. The Universal truck remains perfectly steady no matter how violently the brake may be applied. *This is accomplished by the position of the hangers and relation of the weights to the point of supports.*"

That is—the kicking or non-kicking up under brake pressure and the analogous results of ease of motion in starting or stopping depends upon the relative position of the points of support, and has nothing whatsoever to do with the spring system covered by the claims in question.

This fact, that the character of the spring suspension broadly as here claimed cannot in and of itself have any vital effect with regard to tilting when under brake pressure, is so obvious that we hesitate to burden this Court with arguments as to such points. We only do so because it is necessary to enlighten the Court as to the true state of facts with relation to the theories and arguments by the aid of which it has been attempted to promote the patents in suit from their true status as inventions of a very specific character relating to a certain sub-combination adapted to be used in a certain type of truck, which is only one out of many types, and the merits of which so far as its position in the art is concerned, is practically negligible in determining questions of patentability based thereon. Moreover, if the springs of the Brill Patent do have any effect in preventing tilting when the

brakes are applied to the wheels, this is due to the arrangement of said springs *between* the ends of the semi-elliptics and the side frame and the construction of the hanger which is combined therewith and is not accomplished by buffer springs located above the side frames and independent of the links save for the fact that the upper ends of the links rest thereon. The Brill spring is made a part of the link, the Brill hanger encloses the spring, and the spring must co-operate with the link when the two parts of the link are separated by movement of the truck frame. The Peckham spring buffer supports the end of the link but otherwise cannot be said to be made a part of the link. This is clear from the statement in the Brill & Curwen Patent No. 610,119, page 2, lines 54 to 64 (p. 841, Record) :

“When the brakes are applied to the wheels, which are carried by the end of the truck-frame, as on the cross-bar 13, the tendency is to lift the truck-frame. This movement is resisted by the link-springs, which movement *pulls the stirrup 23 upwardly* against the weight of the car, which tends to keep the follower down on the stop of the spring, compressing the link springs and absorbing this movement, so that its effect is not materially felt on the car or bolster.”

If there is anything in this argument, it was old in the art prior to Brill.

The argument is also made, in support of the alleged invention covered by these patents, that it results in a cheaper truck. There is no basis of comparison upon which to make such a statement. The truck may be cheaper than the Brill & Curwen truck, but this is because it is a lighter truck intended for comparatively light service, while the Brill & Curwen truck is a high speed one more

particularly intended for heavy interurban service (Ans. x-Q. 293, p. 280, C. R.).

The argument may also be made that it starts easier and stops better. No real comparison is made with other trucks. If it starts easier and stops better it is owing to something that is not inherent first in that truck, but is inherent in the Brill & Curwen truck; and it is owing to the fact that it gets a better friction and that better friction arises from the fact that they can hang and do hang two motors on each truck. The Brill & Curwen Patent shows two motors hung on that truck and hung in the same position. The greater friction derived was old when the patent in suit became an entity.

Any argument based upon the assertion that a truck constructed in accordance with these patents stops and starts more easily because the bolster is free to swing longitudinally of the truck or transversely of itself until it strikes the transoms is not pertinent for the following reasons:

(1) Such function as is admitted on the part of the complainants, is of importance only when the truck is propelled by motors mounted on its axles rather than from an outside source. These claims call for car trucks generally, and it is immaterial how they are propelled.

(2) If this function is obtained when the links are so mounted that they are free to swing longitudinally, thereby permitting the corresponding movement of the bolster, such longitudinal swing of the links is not covered by these claims nor made an element thereof.

(3) Such function was old.

*Other claims of the patents in suit specify both a longitudinal and transverse swing of the links, as, for instance, Claim 102 of Patent No. 627,898,*

which was one of the claims upon which complainant originally relied in the North Jersey suit with regard to which testimony was taken, but which was withdrawn at the argument by the admission that Claim 13 must be sustained else all the claims would fall. It is not believed that it is proper for a party to stand on one claim and then attempt to sustain said claim by reference to features not covered in said claim but referred to in other claims. If the Court is to redraft these claims because they terminate with the term "substantially as described," they must then be limited not as to one feature which would enable the claim of infringement to be sustained, but must be limited as to all essential features set forth in the specification and drawings. When so limited there is no infringement on the part of this defendant.

Moreover, the argument as to the necessity and utility of longitudinal *swing* of the suspending link falls full front into the prior art, but irrespective of that shows that there is, in any event, when properly construed, no infringement of the alleged invention of the patent in suit on the part of the defendant. Defendant's link is supported by a pin extending longitudinally of the truck and resting in a cap which is supported by the buffer spring. Thus the link is free to swing on its pin transversely of the truck or of the side frame. If there is any longitudinal movement, however, it is only such as is caused by the compression of the buffer springs slightly more at one end of the pin than at the other when there is a tendency of the link to swing longitudinally. Movement transmitted to the link in this way could be at the best but very slight, would only be present under conditions of abnormal strain, and, we submit, is not such a mounting of the link as gives it freedom for longitudinal swing within the purview of this invention as stated on the part of the complainants.

There is absolutely no new result following from the substitution in the Thyng combination of the spring hanger in place of the non-elastic hanger. Accordingly, such substitution, even if new, does not involve invention, and it is not new, for it long ago arrived at the age of consent.

**Bearing on This Suit of the Interference Brill v. Uebelacker in the United States Patent Office.**

The sole and only point determined by an interference proceeding in the Patent Office is as to priority of invention. There is no more presumption of novelty in the claims because they have been in an interference proceeding than where they have been issued without interference.

Robinson on Patents, Sec. 587, Note 1, and cases there cited.

In this particular instance, however, the records of interference show that the question of priority, even, was never contested, the *judgment entered being solely on the Record*.

As the question at issue is not whether Brill or Uebelacker was the prior inventor, the interference proceedings have no relevancy.

Nevertheless, it appears from the history of this litigation that the complainant will insist that the interference proceedings are conclusive or persuasive, and ignores the well settled rule that at the best such proceedings are only of weight as to the question of priority of invention, and then only between the parties. Whether the successful party in an interference proceeding is entitled, after he has got a patent, to a preliminary injunction against the unsuccessful party who has gone out of the Patent Office defeated, and proceeded to build the structure which was the subject of his contest, is of no importance here, as this is a final hearing. If such a rule exists, it is pertinent to in-



quire why Brill did not proceed upon the issue of his patent against the manufacturer of defendant's trucks and move for a preliminary injunction. The question carries with it its answer. No such rule as that quoted now exists, if it ever did exist.

The case of *Allen, Commissioner of Patents v. the United States of America, ex rel., &c.*, decided May 24, 1905 (116 Official Gazette, U. S. Patent Office, pp. 2255-8), states the theory, scope and history of Patent Office interference proceedings. By this decision it conclusively appears that the question of *priority*, and priority alone, is involved in such proceedings. It will be sufficient to quote three excerpts from the opinion:

"From the foregoing it is apparent that interferences were instituted for the purpose of deciding the question of priority of invention, *and for no other purpose*, \* \* \*"

"We cannot emphasize too strongly that, in our opinion, the statutes relating to interferences only provide that they shall be instituted for the sole purpose of determining priority of invention, and that it logically follows that appeals in such proceedings, so far as the statutes go, only provide for appeals from the decision of *priority*."

"The power to decide the question of priority, which is the sole question for which interferences were provided, as *shown by a reading of every statute on the subject enacted from 1793 down to the present time*. \* \* \*"

Comment is unnecessary.

Again, the rule laid down by the United States Supreme Court and the Circuit Courts of Appeals, is that the decision in an interference *may be res adjudicata* as to priority, but is not as to patentability and kindred questions.

*Haughey v. Lee*, 151 U. S., 282, is specifically in point.

In *National Machine Company v. Wheeler & Wilson Mfg. Co.*, 79 F. R., 432 (Circuit Court of Appeals), the complainant contended that the defendant was precluded from contesting the validity and scope of certain claims of the patent in suit and infringement of the claims by defendant's machine growing out of an interference. The Court, at page 441, said:

"The theory of this contention is that under the rules and practice of the Patent Office either party has a right to move to dissolve an interference on the ground that, in view of the state of the art, the issue framed therein could not be based upon his invention as described and claimed; that failure to move for such dissolution amounted to an acquiescence in the holding of the Patent Office that the inventions of the two parties as limited by the prior art there shown were identical; that they were patentable despite the prior art, and that either might properly be the basis for claims corresponding to the interference issues. And, therefore, that, although it now appears that the original Tebbets and Doggett claims—now Claims 21 and 22—correctly cover defendant's machine, but do not cover complainant's unless an unexpected element is read into them, defendant cannot now avail of that fact to limit these two claims of the patent. We are referred to no authority in support of this contention. It has not been the tendency of the decisions either of the Supreme Court or of the Circuit Courts of Appeals to extend the effect of interference decisions as final adjudication, and we concur with the Circuit Court in the conclusion that, 'while the decision in interference may be *res adjudicata* as to priority it does not preclude defendant from raising other questions not in issue in said proceedings.' "

A petition for a writ of *certiorari* was denied by the Supreme Court, 166 U. S., 722.

Even when the question of patentability is raised and affirmatively settled in the Patent Office it is not binding on the courts (*Empire, &c., Co. v. American, &c., Co.*, 61 F. R., 650).

The proposition may be more broadly stated. Interference proceedings cannot settle the question of patentable invention. The United States Supreme Court has held that of its own motion it may hold that claims which were the issues of an interference are void for want of patentable invention, even though that question was not raised in the Patent Office or by the parties in the court below, or even in the Supreme Court (*Hill v. Wooster*, 132 U. S., 693).

The only question at issue in the *Brill v. Uebelacker* interference was the question of priority of invention. That question is not at issue in this suit, and there is no question in this suit that is *res adjudicata*—not even the question of priority, as far as this defendant either real or nominal is concerned, for it was not a party or privy to the interference (*Walker on Patents*, Sec. 674). Complainants, in rebuttal, sought to charge the defendant, through the Peckham Manufacturing Company, with being privy with Uebelacker to the interference above quoted, under objections to competency and relevancy, what purported to be an excerpt from the certificate of incorporation of the Peckham Manufacturing Company. They have also introduced copious testimony as to the fact that the Peckham Manufacturing Company took over the Peckham Motor Truck & Wheel Company, assignee of Uebelacker, and continued the business without new sets of books. The alleged excerpt from the Peckham certificate of incorporation bears refutation of complainants' attitude upon its very face since it recites (page 277, C. R.) that the

corporation was organized, in addition to certain previously specified purposes, for the "further purpose of acquiring the property, rights, franchises and business of the Peckham Motor Truck & Wheel Company." The excerpt is incompetent, but, irrespective of that, certain it is that the Peckham Manufacturing Company *purchased the property and business* of this Company, and it is equally as certain, in fact being clearly implied in the quotation, that it did not acquire its *liabilities*. In view of the latent ambiguity, however, and of the fact that complainants intimated this attitude assumed for the first time in rebuttal, defendant at once moved for leave to take sur-rebuttal testimony (pp. 89-92, D. R.), which was denied by his Honor Judge Gould without stating his reasons. They may, however, have resided in the belief expressed by him upon the hearing that "off-hand" he could not "discern the relevancy of the testimony sought to be rebutted." However that may be, the defendant was prevented from showing unequivocally the relations between the two companies.

In view of the established decisions, this Court cannot properly hold otherwise than that the Brill-Uebelacker interference is wholly irrelevant to any issue in this case.

#### **Bearing of Testimony of Complainants' Witness Uebelacker.**

An attempt was made by complainants, in rebuttal, to show by the testimony of Charles F. Uebelacker, the patentee of the patent under which defendant justifies, that the Peckham Motor Truck & Wheel Company, connected with the real defendant herein by purchase only, "pirated" the Brill construction involved herein. The defendant immediately applied for leave to take sur-rebuttal testimony upon this point (pp. 89-92, D.

R.), which application was denied by Judge Gould as indicated in the discussion of the Uebelacker interference. Even if (for argument) the birth of defendant's truck construction be predicated upon attempted piracy (which it is not, for the witness repeatedly states that he did not, and after he had seen the Brill construction, did not intend, to copy it), it is believed that this Court has become convinced by this time of the absolute right which the real defendant has to make, use and sell its trucks. In claiming exclusive privileges complainants claim what does not and never did belong to them as far as the issues of this case are concerned, for not only are the claims invalid by reason of anticipation and lack of patentable invention, but they are not infringed. It appears from the testimony of Uebelacker that "before" he "designed the truck for the Peckham Motor Truck & Wheel Company" and "before" he "saw Mr. Young with reference to the order for this Peckham Motor Truck & Wheel Company truck" he had "knowledge of a truck having the same or similar spring system" (x-Q. 66, p. 262, ~~C.~~ R.), and that "the work of designing these trucks . . . was well under way . . ." (x-Q. 67, p. 262, ~~C.~~ R.). It appears further that at this time the witness had made an investigation "of the prior patents in the art . . . for the purpose of knowing what" his "rights were so far as patents were concerned" (x-Qs. 69 and 70, p. 262, ~~C.~~ R.). It further appears that at the time of the witness's visit of investigation in connection with the Brill trucks he had a copy of the Thyng Patent (to which the reference of having knowledge of a truck with a similar spring system related) *in his pocket*, as well as a copy of the Haskins Patent (answer to x-Q. 77, p. 264, ~~C.~~ R.). The purport of the Uebelacker testimony taken as a whole is so utterly irrelevant to any issue involved herein as to make

further comment unnecessary. For the convenience of the Court, however, we quote one or two excerpts:

"x-Q. 96. Referring to the Brill trucks which you inspected and the Peckham trucks which you built, were there any features of construction common to the two trucks which you did not believe at the time you built the Peckham trucks to be also common to the prior art in accordance with the investigation to which you have referred?

"A. Yes, I believe the principle of supporting the ends of the semi-elliptic spring through spiral springs to be subject to the carriage spring patent" (Haskins) "which I have previously mentioned. As this patent, at that time, had still some years to run, I recommended to Mr. Peckham that he obtain a license to manufacture under this patent. I believe that he never did obtain such a license. I did not regard the spring arrangement of the Brill truck as anything new in the art in view of the Thyng and carriage spring patent above referred to" (page 266, C. R.).

"x-Q. 83. And I believe you have testified that the truck which you finally built as a result of all the information you had at hand was similar to the Brill truck only in the location of the semi-elliptic spring and in the character of the bolster.

"A. Yes.

"x-Q. 84. And so far as the location of the semi-elliptic springs and supporting a bolster at its ends upon said semi-elliptic springs was concerned, the truck which you finally built was also similar to the truck shown in the Thyng Patent, was it not?

"A. Yes" (page 264, C. R.).

"Q. 48. In the type of truck as shown by the cut which you identified, what movements are permitted to the elliptical springs?

"A. In the truck shown by the cut labeled 'Complainants' Exhibit Truck shipped to

Traction Co., etc., the arch of the semi-elliptic spring was flattened, so that it would not lengthen when compressed, the links supporting the ends of the elliptic spring were permitted to move freely in a plane at right angles only to that of the side frames" (page 258, C. R.).

It accordingly appears, so far as the Uebelacker deposition has any probative force whatever, that in devising the defendant's truck herein he employed elements and combinations which he knew at the time that he had a perfect right to do in view of the prior art. And two Courts of Appeal have held that he was justified.

#### Extent and Character of Use of the Trucks in Controversy.

There is no evidence that the feature of "the spring link" has induced the purchase of a single truck of the kind in question. The Brill Company is one of the most extensive builders of electric street car trucks in the world. With the markets of the world open to them they have in seven years, according to Mr. Adams, sold about 8,000 trucks, or trucks for 4,000 cars.

As far back as 1902, according to the census report, there were 66,784 equipments in use in the United States which, making allowance for cars still using single trucks, would amount to over 100,000 electric double trucks then in use. This makes no allowance for trucks in use in foreign countries. Without fear of successful contradiction, we assert that the Brill Company could have sold in the same period an equal number of trucks of any style it determined to put upon the market. In fact, complainants' witness Adams admits, in answer to x-Q. 317, p. 294, C. R., that the sale of the *Brill and Curwen*, known as the 27A or No. 27 trucks (Ans. to x-Qs. 313-5, p. 288, C. R.) was "be-

tween 2,000 and 3,000, possibly it exceeds 3,000," and this, too, notwithstanding the fact that they were "high speed trucks" and "*rather expensive*" (Ans. to x-Q. 319, p. ~~284~~<sup>5</sup>, C. R.).

In addition to the foregoing it is interesting to note that the *majority of these 8,000 trucks contained a type of spring link neither shown, described nor claimed in either of the two patents in suit*. In other words, they used the strap hanger of the Adams Patent, No. 637,544 (pp. ~~584~~<sup>5</sup>, C. R.).

"x-Q. 81. What is the trade name of trucks employing the strap suspension as above mentioned?

"A. *They are still called the 27 G.*

"x-Q. 87. Can you state of your own knowledge which lettered style of truck has preponderated in sale?

"A. The 27 G.

"x-Q. 88. Has it had a greater sale than the others put together?" (Referring to 27 B, C and D trucks in which the general character of the spring suspension is identical with the 27 G, answer to x-Q. 77, p. 57, C. R.)

"A. *I would say I believe it has.*"

And in answer to x-Q. 84, p. ~~58~~<sup>537</sup>, C. R., the same witness states that "the 27 G trucks, which have been built in the last few years most," \* \* \* "have had a strap straddling the side bar."

Complainants' witness Uebelacker on this point says (p. ~~266~~<sup>52-54</sup>) in answer to x-Q. 91:

"The trucks later put out by the Brill Co., with this style of spring suspension had a stirrup over the side frame resting in a saddle on the side frame, instead of the ball and socket link. *I first saw this construction myself in 1898.*

"x-Q. 92. (Ans.) *It has been their general style of construction since then.*

"x-Q. 93. In the latter construction is



there any provision for longitudinal movement?

"A. *None at all.*"

It accordingly appears that a large majority, if not absolutely all, of the trucks in controversy sold by the Brill Company have had a type of spring hanger neither shown, described nor claimed in either of the patents in suit, and characterized by a different action. In addition to the foregoing, and although these hangers were built under the Adams Patent above noted, it appears that the trucks were still blazed to the world as being built under the two patents in suit together with the other divisional patent not in suit (x-Qs. 78-9 and answers, p. ~~57~~<sup>538</sup>, C. R.). If the Brill Company has not monopolized the truck market, it is certainly owing to no neglect of its own.

The truck of the character of the patents in suit (excluding Master Car Builders' Maximum Traction and Single trucks) is but one of many in use. This is a part of the universal knowledge of which the Court is judicially cognizant, but, irrespective of that, complainants' own witnesses admit it. Their witness Mr. Harrington states that,

"The manufacturers of trucks of this character are Brill, Peckham, St. Louis Car Co., Taylor, Baltimore Car Wheel and I think the Maguire" (x-Q. 48 and answers, p. 121; and in answer to x-Q. 8, p. ~~112~~<sup>573</sup>, mentions the Bemis, Barney & Smith, and Laconia).

In addition to these complainants' witness Adams named the Curtis (answer to x-Q. 337, p. ~~436~~<sup>575-6</sup>, C. R.), *ten* in all.

Moreover, Harrington, without being asked, indicates that these other makes are not only in use but recognized as excellent and successful trucks. since he states, in answer to Q. 18, p. ~~114~~<sup>573</sup>, C. R.,

comparing the Peckham 14 B-3 truck with the corresponding truck of the St. Louis Car Company, "In comparison with the St. Louis center pivotal double truck the difference in operation is very little." It further appears that there are "about a dozen" "builders of" the Master Car Builders type (Ans. x-Q. 49, p. 121, ~~C. R.~~).

It is noteworthy that complainants' counsel fail to ask a single witness how many Brill trucks (of any character) are in use upon their roads. Under cross-examination complainants' witness Harrington, Vice-President of the New York-Philadelphia Company, operating between Camden and New York (Ans. Q. 3, p. 111, ~~C. R.~~), states that *three* Brill 27 G are in use by his company, and these use the *strap hanger* (see x-Qs. 55-6 and answers, p. 123, ~~C. R.~~). The Baltimore system has 380 miles of trackage and 1,555 "equipments," that is, 3,110 trucks (Ans. before Q. 1, p. 87, ~~C. R.~~) and operates *no* Brill 27 G trucks (Ans. Q. 2, p. 88, ~~C. R.~~), and this, notwithstanding the fact that "it is considered safe to run on a gauge of four feet eight inches" (Ans. x-Q. 61, Complainants' witness Uebelacker, p. 261, ~~C. R.~~), and that the Baltimore gauge is "five foot four and one-half inches" (Ans. Q. 2, p. 88, ~~C. R.~~).

At this point the testimony of the somewhat enthusiastic witness for complainants, Akarman, is interesting (pp. 76-7, ~~C. R.~~):

"Q. 6. To what extent have trucks of this new type such a 27 G and Peckham 14 B-3, gone into general use?

"A. On roads where a car body exceeding 25 feet in length is used, these trucks are almost universally used. I should think at least 80 per cent. of all trucks being of these two types.

"Q. 7. Taking the city and suburban street railway business throughout the country (but excluding elevated railways), what

types of trucks, substantially, cover the entire use in this country, I mean pivotal trucks?

"A. The two types previously mentioned, the Brill 27 G and the Peckham 14 B-3. That would include also the Maximum Traction Truck in pivotal trucks."

Later, at page 82, <sup>361</sup> C. R., he testifies as follows:

"x-Q. 40. How many trucks, approximately, are there in use to-day upon electric railways in the United States?

"A. That is a matter I cannot possibly answer. *I can tell you the number I know of.*

"x-Q. 41. How many do you know of?

"A. I suppose there are at least 50,000 equipments, one single truck or two double trucks constituting an equipment.

"x-Q. 42. About how many double trucks in America?

"A. I should think about 60,000, and there are about 20,000 single trucks, I should think. It is a guess; I am not sure of that.

"x-Q. 43. How do you know that 'considering pivotal trucks only, the practice of the country is divided between the Maximum Traction Truck and the trucks of the type represented by 27 G and 14 B-3.' In other words, aren't you guessing there?

"A. No, my knowledge of the use of double trucks is had from visiting many of the large cities, and also by conversation with managers of small street railway properties."

The foregoing testimony was objected to as incompetent and hearsay, but, irrespective of that and taking Akarman's testimony as a statement of fact, which it obviously is not, we find a peculiar ambiguity or contradiction as the case may be. Accepting further the witness's statement that the Master Car Builder type of truck has only been

applied to electrically propelled railways during the last three years (answer to x-Q. 44, same page), we find that out of about 60,000 double trucks, less the M. C. B. trucks manufactured during the last three years, the Brill Company has sold about 8,000; in other words, about its proper proportion in view of its size and of the existence, as previously mentioned, of some nine or ten other manufacturers of corresponding trucks, if the witness includes these under the terminology "types." If he does not do this, he is obviously flagrantly incorrect, since the Brill sales at their own figures have only amounted to about 8,000 trucks and no one has ever accused the real defendant herein, the manufacturer, of selling more than from 2,000 to 3,000. If a total of between 10,000 and 11,000 trucks is "at least 80 per cent. of all trucks" (double trucks including Maximum Traction Trucks, but not Master Car Builders' trucks), such a figure comprehending a total of only about 14,000 double trucks in the entire country, the facilities accorded the public would indeed be in a bad way. And the witness himself refutes it when he says there are about 60,000 double trucks, less M. C. B. trucks manufactured during the last three years.

Again the question arises and a question which cannot be overlooked, as to what features produced any sale at all of the Brill 27 G trucks. They are variously alleged to be built under three to four patents, the "three patents June 27, 1899 (Ans. Q. 8, p. 49, G. R.) and the Adams strap-hanger patent" (x-Q. 296 and Ans., p. 231, G. R.), but accepting the two patents in suit as their sole sponsors, what claim or group of claims out of the 130 claims of these patents, a large proportion of which are specifically directed to the character of the truck frame, the character of the links, and to various other features, covers the feature or features which caused the sale? Complainants' wit-

nesses frequently state that the 27 G trucks were used by them because two motors could be attached, or the wheel base was short, or because the car body could be hung low (Ans. to x-Q. 56, p. 259, C. R., among others). In addition thereto we find that the "requisites for high speed electric travel" are excellence of road-bed, motive power, strength of equipment and heavy rails, and *long wheel base* (x-Q. 61, and answer, p. 123, C. R.). All of these truck features existed in the Brill and Curwen, the Taylor and many other trucks of the prior art, with the exception that the wheel bases correspond to that of the Brill trucks. We confess we give up the riddle. Even if the complainant had shown that these trucks had had a reasonable amount of commercial success, that is not sufficient to render valid the claims of these patents.

"The popularity of the complainants' stay has been abundantly demonstrated by the proof, but, of course, invention cannot be predicated on this alone (*McClain v. Ort-mayer*, 141 U. S., 419-428; 12 Sup. Ct., 76; *Walk Pat.* (3 Ed.), S. 40). Sufficient reason for the success of the complainants' stays is found in the attractive manner in which they are displayed, their superior workmanship, and the ability with which they have been introduced to the market (*Ypsilanti Co. v. Van Valkenburg*, 72 F. R., 277-281; affirmed 78 F. R., 926)."

*Klein v. City of Seattle*, 77 F. R., 200.

The Brill Company enjoys combined facilities of several companies (Ans. x-Qs. 231-2, p. 221, C. R.).

#### Summary of Defendant's Contention.

It has been our effort, in the main, to comprehensively present this case from the standpoint of some of the controlling considerations.

By this time we believe that it has been proved to the satisfaction of this Court that all of the

claims in suit of the two patents are invalid as anticipated by the prior art and as lacking in patentable invention. If, however, the Court is of the opinion that in order to save the claims they may be limited by construction to the specific construction of the spring hanger or link disclosed by the patentee, then we submit that there is no infringement. If the Court finds with defendant on any of the following propositions, the decree of the Court below should be affirmed.

1. That the claims in suit of the Brill patents disclose no patentable invention over the Thyng patent. Complainants' own witnesses admit this when they admit that both they and any skilled mechanic would be able to remedy defects which they state are present and obvious.
2. That it did not involve patentable invention, and was within the province of the mechanic skilled in truck making, to substitute, in the Thyng combination of spring-supported bolster and non-elastic hangers, the spring hangers or spring-supported hangers, of the Beach, Haskins, Brill & Curwen, Peckham, Oberbach, Heffernan, Longstreth, or other patents.
3. That the defendant substituted the Beach, or the Peckham spring-supported hanger for the non-elastic hanger of the Thyng patent in the combination of bolster and semi-elliptic springs of the Thyng patent, and that it had a right so to do.
4. That the patentee simply substituted the Brill & Curwen, or the Haskins, or the Cooke spring hanger, in the place of the non-elastic hanger of the Thyng patent, in the Thyng combination of bolster and semi-elliptic springs, and that such substitution did not involve patentable invention.

5. That the claims in suit of Patent No. 627,898 do not differ patentably from similar claims in the Brill & Curwen patent, as they only differ in the substitution for the rigid equalizing bar of Brill & Curwen the semi-elliptic springs of Thyng; especially in view of the fact that the Buck patent specifically states that such substitution could be made.

6. That Brill was a mere improver in a well-developed art, and the claims of his patents must be limited to the specific forms of hangers disclosed in said patents.

7. That the combination of the claims in suit of the Brill patents are found in the Haskins patent, and that the public had the right to use the Haskins construction in car trucks.

8. That the combination of the claims in suit of the Brill patents are found in the Buck patent.

9. That the combination of the claims in suit of the Brill patents are found in the Davenport & Bridges patent.

10. That the function of the semi-elliptic springs and the swinging spring links, as set forth in Brill's claims in suit, are the same as the semi-elliptic springs and the swinging spring links of Haskins, Buck and others, and operate in the same way and produce the same result.

11. That the defendant's structure does not infringe the claims in suit of Patent No. 627,898, when limited, as they must be, by the prior art to the specific construction of spring hangers shown and described therein.

12. That the defendant's structure does not, for the reasons stated, infringe the claims in suit of Patent No. 627,900.

13. That Brill, having stated in the specification that the invention covered in Patent No. 627,900 related only to the construction of the links for supporting the semi-elliptic springs, and his attorneys having specifically so stated in prosecuting the case, the claims must be limited to the specific form of links described and set forth in claims 13, 14, 15 and 17.

14. Upon the authority of *Kessler vs. Eldred*, 206 U. S., 285, defendant-appellee is entitled to an affirmance, the subject-matter and real parties in interest being the same as in the North Jersey suit, which suit has been duly pleaded.

Wherefore, in view of the facts disclosed by the record and the law applicable thereto, defendant prays:

That the decree of the Court below dismissing the Bill of Complaint herein, with costs, be affirmed, with costs, to the Defendant-Appellee.

DUELL, WARFIELD & DUELL,  
Solicitors and Counsel for Defendant.



as new inventions when applied to street railway cars, even though a long time may have elapsed between their first use and their application to street cars.

Where the claim is very narrow, as in this case, there is little room for the doctrine of equivalents.

30 App. D. C. 255, affirmed.

THE facts are stated in the opinion.

*Mr. Francis Rawle and Mr. Frederick P. Fish*, with whom *Mr. Melville Church* was on the brief, for appellant.

*Mr. H. S. Duell*, with whom *Mr. Charles H. Duell and Mr. F. P. Warfield* were on the brief, for appellee.

MR. JUSTICE HOLMES delivered the opinion of the court.

This is a bill in equity to restrain the infringement of a patent. The suit is brought against a party that is alleged to have used the patented device, but it is defended by the Peckham Manufacturing Company, the vendor, which is a successor by purchase to the Peckham Motor Truck and Wheel Company. The principal claim now relied upon was declared void in *North Jersey St. Ry. Co. v. Brill*, 134 Fed. Rep. 580; S. C., 67 C. C. A. 380, reversing the decision of the Circuit Court, 124 Fed. Rep. 778, 125 Fed. Rep. 526, a suit brought by the same plaintiff and said to have been defeated by the Peckham Motor and Truck Company. (On the authority of that case a preliminary injunction against the present defendant was refused in *Brill v. Peckham Mfg. Co.*, 135 Fed. Rep. 784; S. C., 68 C. C. A. 486.) If the first Peckham Company was privy to the decree declaring the patent void there would be great force in the argument that that decree established, as against the plaintiff, the right of the Peckham Manufacturing Company to make and sell the patented article, and that the right ought to be recognized in a suit against its customer defended by it. *Kessler v. Eldred*, 206 U. S. 285, 288,

289. It is unnecessary to decide that question, because the formal proofs are wanting, but on the obvious facts we should be unwilling to come to a different conclusion from that reached in the earlier litigation and again in the present suit unless it was impossible to avoid the result. With these preliminaries we proceed to the merits of the case.

The present form of car used on the electric street railways is a long car resting by pivots upon two four-wheeled trucks. The plaintiff makes a truck of this sort and has a parent and a divisional patent for "Improvements in Car Trucks for Motor Propulsion and the Like," dated June 27, 1899, and numbered respectively 627,898 and 627,900. The arrangement in actual use may be described as follows, nearly in the plaintiff's words: The side frames are connected near the middle by two parallel metal cross-pieces or transoms, having space enough between them to allow another parallel piece, called the bolster, to move vertically, occupying the space between with but slight play. The car body rests on a pivot in the middle of the bolster. The ends of the bolster rest on the top of semi-elliptic springs parallel to and below the sides of the truck. The ends of the springs in their turn rest on two spring links hanging from the sides of the truck near the axles. More specifically they are supported on the bottom of metal bands or stirrups which surround and hang by their tops on spiral springs each of which is attached underneath to a metal bolt running up through its middle and connected at the top with the frame of the truck by a ball and socket-joint. That is to say the pin passes up through the frame, in which is a conoidal aperture to give it play in all directions, and the head of the pin is hemispherical seated in a like recess in the frame.

The claims relied upon are the following: In number 627,898 the parent patent,

"13. The combination in a car-truck, of the side frames, the semi-elliptic springs movably and resiliently suspended from the side frames, and a bolster secured to said springs, substantially as described."

"81. The combination in a car-truck, of the side frames, the semi-elliptic springs, a cross-bolster resting on the semi-elliptic springs, links, and springs combined with said links, said links deriving their support from the side frames and connecting the ends of the semi-elliptic springs with the side frames, substantially as described."

In 627,900, the divisional patent,

"13. In a car-truck, the combination with the side frames, of the links comprising bolts pivoted between their ends, said links being pivotally suspended from the side frames, longitudinally-disposed semi-elliptic springs secured to the lower-end of said bolts, a cross-bolster resting on said springs, and further springs included in the link suspension of said semi-elliptic springs, substantially as described.

"14. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and pivotal links, said links comprising a plurality of sections pivotally secured together, and further springs combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described.

"15. In a car-truck, the combination with the side frames, of the cross-bolster suspended below the side frames by semi-elliptic springs and articulated and pivotal links, said links comprising a plurality of sections pivotally secured together, and spiral springs about and combined with said links to elastically suspend said semi-elliptic springs from the side frames, substantially as described."

"17. The combination in a car-truck having an upper chord, of the longitudinally-disposed semi-elliptic springs, a transverse bolster supported upon said springs, links depending from and flexibly supported on said upper chord and passing through enlarged apertures therein, said links being articulated between their ends, the ends of the semi-elliptic springs being supported upon the lower articulation of said links, substantially as described."

The parent patent contains the following disclaimer:

"The location of the semi-elliptic springs outside of the wheel-gage on each side of the truck, together with the location of the links for supporting the semi-elliptics closely adjacent to the axle-boxes, and the swinging of said springs from the truck-frame from such points gives a better support for the car-body than does the usual link-hung bolster supported from the truck-transoms within the wheel-gage. These general features of construction, however, are embraced in an application filed by Samuel M. Curwen and myself on the 3d day of November, 1896, Serial No. 610,902, and therefore I do not claim the same herein."

The answer denies the validity of the patents, setting up a large number of earlier ones, and also denies infringement. There was a trial in the Supreme Court of the District, upon which a decree was rendered dismissing the bill. The decree was affirmed by the Court of Appeals, 30 App. D. C. 255, and an appeal was taken to this court.

It is difficult to put one's finger with certainty upon what the plaintiff claims. It certainly is not the total combination of a successful truck. Mr. Brill, the inventor and the plaintiff's assignor, is pictured as playing a large part in the development of street railway trucks, but whether that be true or not, his share in the invention of the truck that we have described, so far as the present patent at least is concerned, must be at best but very small. It is insisted, to be sure, that the case is not affected by inventions for use with steam railroad cars because of the different requirements upon street roads. Cars for the latter use must be low hung to make getting in and out easy, must accommodate the motors hung upon the axles, must be adapted to short curves and so forth. But these differences are not of universal effect; indeed this patent is not confined to street cars. The suspension of the car body upon a semi-elliptic spring hung from the side frame of the truck by a jointed hanger, with most of the characteristics of the present patent, as disclosed in a patent to Thyng in 1845, was obvi-

ously as available for street as for steam railways, and the use of these features by Brill was not a patentable invention. The use, on the modern long car, of two four-wheeled pivotal trucks with a short wheel base and wheels of equal diameter, which support the car body by a pivot on a bolster between the axles, resting on semi-elliptic springs, was not peculiar to Brill. It was described in a patent to Taylor, October 31, 1895, No. 507,855. Brill's specification disclaims at the outset the general features of the truck it describes. Indeed it hardly is denied that every element in the combination was well known in the construction of railway cars.

We are not dealing with a new type of trucks, but with certain features only. At the argument it was admitted that the plaintiff's case must stand or fall on claim 13 of No. 627,898. In that claim the only possible element of novelty is the mode in which the semi-elliptic springs are suspended from the side frames. In practice the links are elastic and the pins on which the whole combination hangs have a universal ball and socket movement, although the claim only says 'movably and resiliently suspended . . . substantially as described.' Neither 'movably' nor 'resiliently' indicates the ball and socket arrangement, but it is described in the specification and we give the plaintiff the benefit of the doubt. We agree, however, with the Circuit Court of Appeals that the substitution of a ball and socket movement for the movement in one direction of the Thyng link, coupled as it was with a slight longitudinal play, required a minimum of invention. A link having universal movement was patented by Beach in 1876. The plaintiff's witness, Akarman, says that there always has been provision made for lateral and longitudinal motion in every well-constructed truck. Spring links to support semi-elliptic springs were old; it is unnecessary to recite the patents in which they appear. The mention of 'the usual link hung bolster' in the disclaimer indicates the indisputable fact. We also agree with the other court that the disclaimer in favor of Brill and Curwen is a solemn admission of the priority of the

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devices claimed by them. It certainly covers the collocation of the spring links and semi-elliptic springs. One of the claims of Brill and Curwen is, "12. The combination in a car truck of the side frames, the equalizing-bars movably and resiliently suspended from the side frames, and a bolster supported on said equalizing-bars, substantially as described." It is said that the Brill patent did not follow the Thyng invention for more than fifty years. The answer is that for most of that time it was not wanted. Very soon after the change in street railway travel required it it came.

If the plaintiff's claim could be sustained, which we cannot admit, it would be confined to the specific form of link described. There would be little room for the doctrine of equivalents. The defendant's device does not use a ball and socket but uses a rigid link supported by a relatively unyielding spiral spring in the frame of the truck, and does not infringe the very narrow claim which is the most that in any view could be allowed.

*Decree affirmed.*

MR. JUSTICE McKENNA dissents.

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